NATIONAL EDUCATION ASSOCIATION

Report of the Committee

ON

The Place of Industries in Public Education

TO THE

National Council of Education
July, 1910

PUBLISHED BY THE ASSOCIATION
1910

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REPORT OF THE COMMITTEE

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THE PLACE OF INDUSTRIES IN PUBLIC EDUCATION

To The Board of Directors, National Education Association:

The undersigned Committee on the Place of Industries in Public Education, appointed at the meeting of the Board of Directors at Los Angeles, Cal., July 11, 1907, has the honor to submit the following report.

The report proper is preceded by an historical statement as to the organization of the committee by the secretary, an introduction written by the chairman, and by the three following papers:

"The Industrial Factor in Social Progress," by FRANK T. CARLTON, Professor of Economics and History, Albion College, Mich.

"The Industrial Factor in Education," by ERNEST N. HENDERSON, Professor of Psychology and Education, Adelphi College, Brooklyn, N. Y.

"History of Industrial Education in the United States," by the secretary, CHARLES R. RICHARDS, Director, Cooper Union, New York, N. Y.

At the end of the report is a selected bibliography prepared by Howard D. Brundage and the secretary.

JESSE D. BURKS, *Chairman*
CHARLES R. RICHARDS, *Secretary*
EDGAR S. BARNEY
HOWARD D. BRUNDAGE
FLORA J. COOKE
ARTHUR D. DEAN
WILLIAM H. ELSON
CARLETON B. GIBSON
CALVIN N. KENDALL
ERNEST B. KENT
CHARLES H. KEYES
E. EUPHROSYNE LANGLEY
FRANK M. LEAVITT
GEORGE A. MERRILL
CHARLES H. MORSE
CARROLL G. PEARSE
DAVID S. SNEDDEN
CHARLES F. WARNER

HISTORICAL STATEMENT

At the meeting of the Board of Directors of the National Education Association on July 12, 1907, in Los Angeles, Cal., the following resolutions were communicated to the Board of Directors by Mr. Frank M. Leavitt, president of the Department of Manual Training:

REPORT OF COMMITTEE ON RESOLUTIONS OF THE MANUAL-TRAINING DEPARTMENT OF THE NATIONAL EDUCATION ASSOCIATION NOW IN SESSION, JULY 11, 1907

WHEREAS, The accumulative work of the department during the last two years seeking a more rational statement of courses of manual training, seems now to indicate a necessity for some definite work by a special committee.

Be it therefore resolved, That the manual-training department of the National Educa-

tion Association, now in session, recommend the appointment of a committee for the purpose of collecting data of the manual-training work done thruout this country, that suggestive courses adaptable to various conditions found therein, may be formulated by them.

Further be it resolved, That this committee consist of three persons now actively engaged in manual training, with power to add to their number, a superintendent of schools, a teacher of art, a child's study specialist, a grade teacher, and a representative from such other departments as may be deemed advisable to increase the efficiency of their work.

Be it further resolved, That the aforesaid committee of three be appointed by the president of this department.

Be it further resolved, That this committee be appointed for a term of two years, being requested to make a preliminary report at the next meeting of this association.

Resolved, That a commitee of one be appointed by the president of this department to make formal application to the Board of Directors of the Association for an appropriation to defray the expenses of the committee.

Respectfully submitted,

CHAS. M. MILLER, Los Angeles, Cal., *Chairman*
AUGUST AHRENS, Warrensburg, Mo.
ADA F. BLANCHARD, Los Angeles, Cal.
Committee on Resolutions

On motion, the application of the Department of Manual Training was received and approved and it was ordered that the desired committee be appointed by the president of the Department of Manual Training and that $500, or so much thereof as may be necessary, be appropriated for the expenses of that committee.

The committee was organized at the meeting of the Department of Superintendence at Washington, February, 1908, with the following membership as appointed:

JESSE D. BURKS, Director, Bureau of Municipal Research, Philadelphia, Pa., *Chairman.*
CHARLES R. RICHARDS, Director, Cooper Union, New York City, *Secretary.*
EDGAR S. BARNEY, Principal, Hebrew Technical School, New York City.
HOWARD D. BRUNDAGE, Teachers College, Columbia University, New York City.
CARLETON B. GIBSON, Superintendent of Schools, Columbus, Ga.
CHARLES H. KEYES, Supervisor of Schools, Hartford, Conn.
ELIZABETH EUPHROSYNE LANGLEY, School of Education, University of Chicago.
FRANK M. LEAVITT, Director of Drawing and Manual Training, Boston, Mass
GEORGE A. MERRILL, Principal, California School of Mechanical Arts, San Francisco, Cal.
CHARLES H. MORSE, Secretary, Commission on Industrial Education, Mass.
CHARLES F. WARNER, Principal, Technical High School, Springfield, Mass.

It was decided at this time to increase the scope of the report to include a study of the entire question of the place of industries in public education and a plan for the arrangement of the report was adopted.

The committee made a report of progress at the Cleveland meeting of the National Education Association in July, 1908, and at this meeting the Board of Directors authorized the increase of the number of the committee to not less than fifteen and not more than twenty.

According to the terms of this authorization the following members were added to the committee:

Flora J. Cooke, Principal, Francis W. Parker School, Chicago, Ill.
Arthur D. Dean, Chief of Trades Division, New York State Education Department.
William H. Elson, Superintendent of Schools, Cleveland, Ohio.
Calvin N. Kendall, Superintendent of Schools, Indianapolis, Ind.
Ernest B. Kent, Director of Manual and Industrial Training, Jersey City, N.J.
Carroll G. Pearse, Superintendent of Schools, Milwaukee, Wis.
David S. Snedden, Commissioner of Education for Massachusetts, Boston, Mass.

The work of preparing the main body of the report has been done by three subcommittees, as follows:

THE PLACE OF INDUSTRIES IN THE ELEMENTARY SCHOOLS

Elizabeth Euphrosyne Langley, *Chairman* — Flora J. Cooke
Ernest B. Kent, *Secretary* — Calvin N. Kendall
Howard D. Brundage — Frank M. Leavitt

INTERMEDIATE INDUSTRIAL SCHOOLS

Carleton B. Gibson, *Chairman* — Edgar S. Barney
David S. Snedden, *Secretary* — Charles H. Morse
Carroll G. Pearse

INDUSTRIAL AND TECHNICAL EDUCATION IN THE SECONDARY SCHOOLS

Charles H. Keyes, *Chairman* — William H. Elson
Arthur D. Dean, *Secretary* — George A. Merrill
Charles F. Warner

The secretary of the general committee was ex officio a member of each of the subcommittees.

At the Denver meeting of the National Education Association the General Secretary of the Association was authorized by the Board of Directors to print and distribute an edition of the report sufficiently large to supply the active members of the Association.

Charles R. Richards, *Secretary*

INTRODUCTION

The manual-training "movement" and its successor, the present vigorous industrial-education propaganda, have exercised for more than a quarter of a century a dominant influence in the educational thought of the United States. The early arguments for manual training and the later arguments for industrial education have a singular and significant resemblance. More vital motive for school work, better adaptation of the curriculum to the needs of the rank and file, reduction of school "mortality," and promotion of national industrial efficiency—these are among the more urgent reasons that have been advanced, thruout the entire period, for a more adequate attention to "handwork" as a supplement to, or substitute for, the traditional "headwork" of the schools.

With the abandonment of the theory of "general training" based upon the so-called "faculty psychology" the arguments for manual activities in the school, while retaining much of their original form and phraseology, have been given more specific application than was at first thought necessary. Not motor training, but specific motor abilities; not accuracy, judgment, and honesty, but keener appreciation of some of the most significant industrial processes; not preparation for life—any life—but preparation for a specific kind of life is now urged by those who are leading in the present demand for industrial education.

Notwithstanding the obvious similarity and direct connection between the early and later attitudes toward handwork and industrial activities, there is, then, a most important distinction between the two points of view. The earlier movement emphasized abstract psychological values; the later places the emphasis upon concrete social values. This change in emphasis is, of course, but one aspect of the general trend of educational thought for the past generation.

The present report attempts to gather up and put into coherent and convenient form the results of these thirty-five years of thought and practice. If this service has been acceptably rendered, such reiteration of accepted theory as has characterized educational discussions for three decades, may be appreciably reduced during the next three decades. A larger proportion of the energy of educational leaders may then be devoted to working out in practice the theories that all accept; to testing both theory and practice by facts instead of by opinions; to measuring results by standards that make comparison possible and intelligible; and to reporting results so accurately and so clearly that school officers, students of education, and citizens anywhere may find it easy and profitable to read the story of educational achievement for every community that has a story to tell.

Readers of this report may be disappointed at the relatively small attention given to results as distinguished from opinions in the field of industrial education. For this relative emphasis there are several reasons.

In the first place, a similar disproportion has marked the actual development of manual training itself and, to a considerable extent, of industrial education as well. Opinions have been more plentiful than facts, and vastly more has been said than done. About one-half of the thirteen hundred city and town school "systems" in the United States, it is true, have introduced, somewhere in their curricula, various forms of constructive activity denominated handwork or manual training. In only one hundred and fifty of these cases, however, does the handwork extend thru all of the grades of the elementary schools, and in only about one hundred cases into the high schools. Of the six hundred school systems having manual training, three hundred give less than an hour a week to it; and only thirty-seven devote as much as half an hour a day to the subject.

In the field of elementary education, then, the continuous and at times

strenuous discussion of thirty years has not produced results commensurate with the importance attributed to manual training by its advocates. Notwithstanding much notable advance, due largely to the influence of manual training, toward a more intimate and vital connection between thinking and doing in the school, handwork in the school is still in the main abstract, isolated, impractical, and unsocial in character.

The industrial-education propaganda of the past decade has likewise, in a measure, failed to affect educational practice to the extent that public interest, professional and lay discussion, and legislative provisions might have justified one in expecting. There is doubtless a keener appreciation than ever before of the social need for industrial education; but there has been relatively little advance in the way of detailed working-out of curricula, organization, and procedure for industrial schools of various types. Within the last few years, however, the demand for industrial education has made itself felt even within the field commonly assumed heretofore to be the exclusive territory of elementary education; a few public intermediate schools and trades schools of a distinctly vocational type having come into being. The result of these experiments is being awaited with eager interest.

In the field of secondary education, there is even greater discrepancy between the promise of theory and the reality of practice. There are about one hundred and fifty schools of secondary grade in the country that are classified in the reports of the Commissioner of Education as manual and industrial training schools. Of this number, however, only one-half are reported as giving any attention to the manual arts. Thirty of these are public high schools; most of which devote from five to nine hours a week to manual, technical, and industrial instruction. Some give as little as four hours a week, and a very few as much as twelve hours a week; but fewer than half of them give as much as one-third of their time to such instruction. With two or three possible exceptions, none of these public high schools may be ranked as technical high schools according to the definition proposed in the present report—the distinctive industrial or vocational purpose being almost uniformly absent.

A second reason for the disproportionale attention given in this report to opinion, without an adequate body of supporting facts, is the difficulty of obtaining verified data from the records and reports that are available. Aside from bare statements concerning enrollment, attendance, and gross expenditure, but few records of actual achievement and few measures of efficiency can be obtained as a basis for exact study of the problems involved. Opinions are numerous but facts are few when one seeks to ascertain what are the elements and what the evidences of "industrial intelligence" of various types; when these evidences may be expected to appear in boys and girls; how natural aptitudes may best be discovered and fostered; how the industries are to be classified on the basis of mental and physical abilities required; what industries do and what do not lend themselves to effective treatment thru industrial education; or what is the probable cost of various forms of industrial

training. Authoritative answers to such questions are essential to a safe and orderly development of a program of industrial education. Actual experiment and practice, however, are so limited in extent, and descriptions of results so lacking in accuracy and detail, that any careful and comprehensive study of industrial education must very largely lay its own foundation.

Thorogoing scientific investigation of the problems of industrial education clearly ought to be made. Limitations of time, of financial resources, and possibly of imagination and vision, however, have not permitted the committee to ascertain, by original research, data necessary to a critical and constructive report that should be at once comprehensive and convincing.

The report is, nevertheless, both critical and constructive in its purpose and method. It looks forward to the further accumulation of facts, to constant comparison, and to progressive readjustment of thought and practice in the field that it attempts to survey. The report, it is hoped, will furnish many points upon which those who continue to explore this field may get their bearings. Even if some of these points prove to have been wrongly located, the report will have served a useful purpose if it leads more careful observers to verify its base lines and test its calculations.

The report, it will be noted, makes no pretense of considering all of the obvious relations of industry to public education. The household arts and agriculture, for example, are hardly more than mentioned, tho these are clearly among the most significant of all industries. Trades schools, evening continuation schools, and technical schools of college grade, likewise, are considered only so far as to show their place in a comprehensive scheme of industrial education; not at all in detail. The aim has been to state, with some completeness, a theory of the place of industries in public education; and to illustrate the specific application of such a theory to a certain type of school in each of the three fields of elementary, intermediate, and secondary education.

Briefly summarized, the results of the committee's work may be stated as follows:

1. Industry, as a controlling factor in social progress, has for education a fundamental and permanent significance.

2. Educational standards, applicable in an age of handicraft, presumably need radical change in the present day of complex and highly specialized industrial development.

3. The social aim of education and the psychological needs of childhood alike require that industrial (manual-constructive) activities form an important part of school occupations.

a) In the elementary school, such occupations are necessary to provide concreteness of motive and meaning; to insure positive and lasting results for instruction; and to bring about a vital relation between life within the school and life outside.

b) In intermediate schools, industrial occupations are an important element in the wide range of experience necessary for the proper testing of children's aptitudes as a basis for subsequent choice of specific pursuits either in vocations or in higher schools.

c) In secondary schools, industrial occupations properly furnish the central and dominant factor in the education of those pupils who make final choice of an industrial vocation. Vocational purpose is the distinguishing mark of the "technical" high school as distinct from the "Manual Training" high school.

4. The differences among children as to aptitudes, interests, economic resources, and prospective careers furnish the basis for a rational as opposed to a merely formal distinction between elementary, secondary, and higher education.

Later in the report, these three stages of education are clearly defined from this point of view. The proposed definitions are, of course, radically different from those that underlie prevailing usage. The constant introduction into current discussion of such terms as "intermediate" school, "upper grammar" grades, "lower high" schools, "junior" and "senior" colleges, is in itself evidence of a real need for readjusting both our educational concepts and our educational organization to conform more nearly to the facts of genetic psychology and social requirement. From this point of view, then, it is of the highest importance that attention be directed upon the differences in function which are more or less clearly recognized in all attempts to separate education into its several stages.

Notwithstanding some confusion in terminology, due to an attempt to follow prevailing usage so far as possible, the committee's report as a whole recognizes the distinctions proposed in the second chapter. According to these definitions, it will be noted, "intermediate" industrial schools, the college preparatory "high" school, the "manual training" school, and the non-technical "college" would all be classified as *secondary;* their common and primary purpose being to recognize and provide for *differences* among their pupils—bringing these differences clearly to light, and furnishing the basis for intelligent choice of careers. The "trades" school, the "technical high" school, the "professional" school, and the "university" would alike be classified as *higher* schools, their common function being to provide special training for persons who have advanced to the point of making definite choice of careers and who are qualified to undertake the requisite specialized training.

While it is not expected that the proposed distinctions will modify established terminology in any radical way, it is submitted that a scheme of education based upon some such concept of function is absolutely essential to that "equality of opportunity" which educational leaders have so enthusiastically assumed to be the foundation of democracy. In our devotion to equality of opportunity as an abstraction, we have long denied to our children the reality of opportunity as measured by varying needs, tastes, and abilities. In our very worthy insistence that every individual should find an open door to any distinction that may be within his reach, we have held on persistently to a system of education originally adapted to the requirements of the "learned" professions, and are just now finding that such a system is poorly adapted to the development of leaders in commercial, agricultural, domestic, and industrial pursuits.

The present report assumes that a democratic community, by its very nature, must accept the obligation of providing every boy and girl with an educational opportunity that shall be not merely free, but enlightening; not merely compulsory, but compelling; not merely expansive, but vitalizing. A system of public education affording such opportunities is absolutely essential to the development of an intelligent, responsive, and efficient citizenship;

and this, in turn, furnishes the most secure, if not the only, guarantee of a permanent and triumphant democracy. It is with the purpose of clarifying this ideal and of hastening its realization that the committee submits its findings and constructive suggestions as to the place of industries in public education.

JESSE D. BURKS,
Director of the Bureau of Municipal Research, Philadelphia, Pa.,
Chairman

THE INDUSTRIAL FACTOR IN SOCIAL PROGRESS

FRANK T. CARLTON, PROFESSOR OF ECONOMICS AND HISTORY,
ALBION COLLEGE, ALBION, MICH.

Social progress is vitally and intimately connected with modifications in the methods of doing the world's work. As the means employed by the members of society in getting a living are improved, institutions, customs, and social conventions undergo radical changes. The advance of a primitive people from the hunting or the pastoral stage was accompanied by revolutionary changes in the home, industrial, military, and social life. The character, ideals, customs, beliefs, and training of the people suffer gradual, but important, transformation as an inevitable result of new work, discipline, and experience which exert silent, but constant, pressure upon each and every individual member of the primitive tribe or horde. In the agricultural stage constant migration is replaced by relative fixity of habitation. Personal property which was an impediment to a pastoral people becomes a desirable acquisition of the agriculturalist. The rude hut is built or improved. Property in land begins to emerge, and slavery arises. New ideals and customs characteristic of an agricultural people slowly displace those built up among the hunters or the herders. A multitude of social, political, military, commercial, and religious changes are the natural and inevitable results of the modifications in the industrial life of the people. The progress from slavery to serfdom and from serfdom to the modern wage system was preceded by changes in the density of population and in the industrial methods employed in the community.

Especially within the last century and a half the intimate relation between industrial evolution and social progress has been forced upon the attention of all students. The occidental peoples have been transformed. Rural life, isolation, the domestic system of industry, non-specialized work, are replaced by urban life, interdependence, the factory system, and minute subdivision of labor. The individuals and nations of the globe have been brought closely in touch with each other. The fighter has been displaced by the financier, status by contract, the isolated worker by the trade unionist, the partnership by the giant corporation, the local by the world market, the stage coach by the Pullman, and the sickle by the harvester. These kaleidoscopic changes in industry are distinctly and inevitably reflected into the home, social, and political life of the community. New laws, new governmental forms, modified relations between husband and wife and between children and parents, new

social imperatives, and new relations between different social classes are the visible fruits of industrial transformation. If one would gain an intelligent knowledge of the evolution of legal forms and ceremonies, political institutions, social conventions, educational ideals and methods, and religious and ethical concepts, industrial evolution must first be carefully investigated. Much of the current discussion of reform movements of various kinds is vitiated because adequate attention is not paid to the fundamental forces which are producing the visible social changes.

In the study of the political, social, educational, or ethical problems of today, two important facts, often neglected by the student who is unacquainted with the history of industrial evolution, must be given careful consideration. In the first instance, the social environment including the sum-total of influences which bear upon the life of the individual has been enlarged. People, intelligence, goods, now come from or go to distant parts of the earth quickly, regularly, and surely. The world of the twentieth century is one vast neighborhood; no dark, unknown continents remain upon the map. In the second place, specialization of industry has tended to confine the life and activity of the vast majority of workers of all grades within very narrow grooves. While modern methods of communication and transportation, world markets and the multiplicity of industrial products offer opportunities to broaden the mental horizon and tend to differentiate the demand of each individual for necessities, comforts, and luxuries, occupations have been specialized and subdivided until the life of the individual is cramped. Earlier forms of industry gave the worker a relatively broad outlook, and did not force him into a rigid routine. Our daily work and home environment usually tend under modern conditions to astigmatize our view at the time when democracy and world unity should thrive. This is the grim and forbidding paradox of modern industrial life.[1]

Human society presents a bewildering panorama of rapidly shifting scenes. Our problem is not to prevent industrial and social change, but to reduce the friction which necessarily accompanies it and to eliminate evils which are connected with it. To conserve the good and to minimize the evil is the double task of society. The factory system, for example, is an economical and labor-saving device; but it has certain undesirable features such as extreme specialization and the employment of young children. How can the system be preserved and the danger reduced to a minimum? is our problem. It is not: How can the system be abolished? The task is not the preservation of the old intact; but it is the adaptation of social, political, ethical, and educational ideals and methods to the unique conditions produced by industrial advance.

The meaning and scope of such terms as morality, law, justice, liberty, patriotism, and nation change with the world's progress. In like manner are the meaning and scope of education changed. There is no fixed and cosmopolitan definition for any one of these terms. Industrial organization quietly forces its peculiar impress upon each and all. In order to illustrate this point

[1] Carlton, *Education and Industrial Evolution*, pp. 47–48.

consideration will be given to the influence of industrial change upon educational evolution. Education in its broadest sense includes the totality of personal experience which forms the character and personality of a particular individual member of society. Education from this viewpoint is life, and is imparted in an informal way as well as in a formal manner. Education in the narrower and technical sense is the training which is given by a more or less definitely articulated mechanism usually denoted a school system. Or, in other words, it is training given in a formal manner. Human progress causes the transfer of certain forms of training from the informal to the formal group. Among primitive peoples education was entirely informal; but among modern people of the industrial type, the sphere of formal education has seriously encroached upon the old preserves of informal education. In the long eras preceding modern times, education was received in an informal manner from the father, the mother, and associates. The young were apprentices. In the Middle Ages and down to comparatively recent times formal education was for the privileged few, and was divorced from the ordinary activities of life. Even in the United States until recent decades, the functions of the school were not numerous; the chief work of educating the youth devolved upon the home, the shop, and the farm. Today the scene is changed. Slavery, feudalism, isolation, militarism, aristocracy, have been replaced by the wage system, crowded populations, co-operation, industrialism, democracy. The home shorn of its industry and its playground and the shop of its apprenticeship system, have been deprived of many educational functions. Formal school education has suddenly assumed a dignity and importance unknown to it in the past history of mankind.

During the last century industrial and scientific progress outran all other forms of development. An intricate problem of the modern sociologist is to bring our educational, legal, economic, and social values and ideals into harmonious relations with the present industrial situation. Legal, political, religious, or educational concepts formed when militarism was predominant are useless or worse than useless today. Concepts formed when modern industry was in its infancy, when it was still differentiated into small and isolated units, when standardization, specialization, and world markets were still of the future, do not square with the requirements of the modern integrated and interrelated industrial system. Sociology, political science, and scientific education must discard the old and accept the new in so far as progress makes such a change desirable. Time is, indeed, required to remodel educational, legal, political and ethical systems so that they will conform to the demands of a modern industrial society familiar with railways, telegraphs, giant corporations and crowded cities. It is the primary function of an educational system to aid in this adjustment. After an era of extraordinary economic progress, the conflict between the inertial force of established institutions, customs, and legal dogmas, and the pressure of a new social and working environment becomes a most striking sociological phenomenon. The haphazard,

patched-up condition of the American school curriculum, the contradictory decisions of the courts of law, the widely differing codes of morality and the dissimilar standards of artistic criticism of the present era are, in no small measure, due to the antagonism between traditional norms and standards which were conceived before the modern industrial era was ushered in, and those norms and standards which are being developed under the stern pressure of today's unique economic and social relationships. Both reformers and reactionists have been too prone to appeal to authority, class prejudice, superficial manifestations and vociferous declamation. The resultant clamor and confusion have obscured the real situation, and have retarded the calm and deliberate investigation of social forces.

The proper function of an organized school system as well as of a political or a legal system, is one which constantly changes to fit the shifting social and industrial conditions of the country and of the epoch. Not only has the division of functions between formal and informal education changed, but the scope of formal education has been immeasurably broadened with the advancement of mankind from primitive to civilized modes of living, working, and associating. The work of formal education has been broadened not merely because of the growing intricacy and complexity of human life and industry, but also because the educational functions of other institutions such as the home, the shop, and the home playgrounds have diminished in importance. The school has been obliged to add duties which have hitherto been performed by other institutions. The home can no longer give youth adequate training in manual industry. The shop because of subdivided labor and speeded-up methods of modern industry offers inadequate opportunity for the young apprentice. Society must adjust itself to a more crowded environment and to systematic and large-scale industrial operations. In the process of adjustment involved in passing from small-scale and unsystematic to large-scale and routinized industry, social and political institutions including the public-school system must undergo fundamental modifications. The scope of formal education can only be definitely and scientifically delimited by determining (*a*) the totality or content of education in a given epoch, and (*b*) the portion of this entire field which can be adequately occupied by the various institutions which informally train the youth—the home, the shop, the store, the farm, the home playground. If education is to become a social science, this problem must be patiently and systematically studied. Cultural imperatives and psychological investigations are insufficient; a science of education rests on the basis of social and economic progress and demands. Until this basic truth is clearly recognized no science of education can be formulated.

The classic concept that formal education consisted chiefly in mere passive reception of abstract ideas, that it was in reality only a carefully worked-out system of mental gymnastics, was a view indigenous to an epoch before specialization of industry and the factory system became predominant in fixing the methods of doing the world's work. This idea was the product of a period

when education was chiefly informal, when the home and the small shop readily provided the training necessary for all except a small number of professional men. In recent decades a more positive view of the function of an educational system has been generally accepted. The introduction of manual training and laboratory work into the curriculum of the public schools definitely marked an important modification in the theory and practice of education. This social phenomenon was the visible and direct consequence of important and revolutionary changes in American industrial methods and social conditions. These strangers in the sphere of formal education found the way smoothed because of the rapid progress in industrial development which was produced by the Civil War. Trade, business, industry, did not bulk large in the direct determination of American educational methods and values until after the second industrial revolution which followed the outbreak of domestic strife.

The laboratory and the manual training school are not content with mere passive receptivity on the part of the student; but require self-activity and constructive work. The introduction of these important educational accessories indicates clearly to the thinking student of social science and industrial evolution that the home, and probably the shop, had at that time lost many of their industrial characteristics. Division of labor and large-scale industry were becoming predominant in the manufacturing world. Important industrial innovation led directly to revolutionary changes in the political and educational spheres. The old methods of formal education were discarded and the old concepts displaced. At the opening of this epoch in the history of education, the school entered upon a new period of evolution; it became more than a mere place for the unwilling student to con over the problems presented in books. The functions of a workshop and of a laboratory are added to the duties of the traditional school. The work of the school system has become something more than that of mere preparation for some one of the so-called learned professions.

Ethical, social, and educational values not only change from generation to generation in response to industrial advance, but they are different in different countries at any given time. Furthermore, the various classes in a community will not agree upon any customary or new standard of education; it must be frankly admitted that even the most broad generalizations are liable to meet opposition because of fundamental differences of opinion as to the proper purpose of a public-school system. In like manner many social reformers meet serious opposition because of vital differences of opinion as to the desirability of certain changes in social relationship.

Today one class of men who are insistently urging that the public school emphasize industrial and trade education, do so because they wish an increased supply of workers who are mere workers or human automatons. Many influential employers in the United States are demanding in no uncertain tones that the public schools be utilized to turn out narrowly trained industrial

workers who may become passive links in the great industrial mechanism of the present age. Systematization and specialization are the favorite watchwords of this class. The application of factory methods to the school is demanded in the name of efficiency and economy. Standardization, not individual treatment, is the ideal of the business man. The manufacturers were not vitally interested in manual training which was introduced as a pedagogical necessity in order that each and every child might have an opportunity to use his hands in some form of constructive work. In fact the manufacturers, because they were taxpayers, were inclined to oppose manual training as it was expensive. The purely educational value of this training to the American youth did not appeal to them since it did not directly swell profits and increase dividends. But now, when skilled men are an urgent necessity, the proposition is judged very differently; an organized effort is being made by captains of industry to convert the public schools, or certain departments of the educational system, into schools for apprentices.

Another class of men are standing for the proposition that the public-school system should train efficient workers who are also thinking men and women capable of enjoying art, literature, and leisure, and who will be able to intelligently consider the political and social problems which will inevitably arise in the twentieth century. This class demands that a well-rounded development be given each child, and that each student be prepared for useful and efficient work in the community. These two views are almost diametrically opposed to each other. The standards utilized for the measurement of educational values are entirely different. The first class, however, is quite harmonious in its agreement as to the proper scope of educational work; the second class unfortunately is not.

The progressive educators of the nations, those who are attempting to formulate a real science of education which will be a directive factor in social progress, must definitely place themselves within the second class. Industrial or vocational education should become an integral part of formal education in an epoch or a nation when industry has become large-scale and subdivided, when the home and the shop are no longer adequately fitted to impart vocational training. But since large-scale industry and subdivided labor are necessarily only present in a period of world markets and world intercourse, vocational training must be indissolubly linked with other forms of training which will broaden the outlook of the student, which will make him a citizen as well as an efficient worker with hand or brain. The aim of modern education should be, if the aim be anything more than the production of a nicely articulated industrial system, to produce men, not machines. The school, according to any broad and reasonable social concept of its function, should send from its doors healthy, efficient, and well-trained producers who possess characteristics which will enable them to live as well as to make a living.

However, before it will be possible to obtain a semblance of unanimity in regard to sociological or educational values, some fairly definite standard

of judgment for all social and political institutions must be utilized. This is a prime essential. Is there any yardstick for the measurement of social values which will be acceptable to many different classes and interests? The customary standard of recent decades has been social welfare, the good of society considered as a unit. But this popular criterion is open to the serious indictment of indeterminateness and ambiguity; it is too indefinite for practical use. Social welfare is interpreted in as many different ways as there are different classes and interests in the community; and industrial progress has increased the number of classes and interests, and has brought different nationalities into contact with each other. If we are to judge accurately of the influence of industry upon social progress, of the value of any social or political institution, or of the importance of any proposed measure of reform, some fairly definite, tangible, and fundamental standard must first be established which will supersede that of the social welfare or the good of the greatest number. If this can be successfully accomplished, all except the most radical reformers or revolutionists on one hand, and the most reactionary of the conservatives should be able to meet upon common ground, and to work in practical harmony in hastening institutional reforms of various kinds. Professor E. A. Ross, of the University of Wisconsin, has insisted that policies and institutions should be evaluated according to their significance in improving the character of the human race or the "breed of men." Men can fairly well agree upon a definition of health, efficiency, and individual and social stamina; but not upon that abstract concept, the good of all or social welfare. Few there are who will openly question the desirability of any institution or any measure which will aid in raising the standard of health, economic efficiency, or intellectual acumen. Industrial or vocational education, or any other policy from socialism to the abolition of child labor in factories, should stand or fall by this definite, fundamental, and universal test: Does or does it not tend to improve the health, vigor, and efficiency of the race?

Recent study and investigation have shown us that industrial progress has made society rather than the individual chiefly responsible for the existence of dislike of school work, inefficiency, ill-health, and criminality. The greatest wealth of a modern nation is bound up in its citizenship; and its citizenship, thanks to the "industrial factor" in modern life, is chiefly a social product. The presentation of abstract educational ideals and values without due regard for the conditions of home, shop, and leisure-hour environment, is a futile process. The great problem of the present, the one which towers above all others, is to universalize opportunity for decent health and comfortable living not for a few but for all; it is to give to each and every child in this great and rich land of ours the heritage of a child—decent home surroundings, sufficient and proper food, opportunity to play, and a chance to use hand and brain in some form of constructive work. This is the social, political, and educational problem of the age; and the peculiar form in which it is presented to the present generation is due to industrial advance. The key to its solution can be

found only by him who searches by way of the path of industrial evolution. The "industrial factor" is the chief factor in modern social, political, and educational problems; because industry is the determining factor in fixing the conditions of living, working, playing, associating, resting.

If this basic and tangible standard for measuring institutional values be accepted, education and statistics become the trusted servants of sociology—the science of social progress. The true function of an educational system is now clearly seen to be directive; it should give efficient aid in reducing the friction inevitable in human society as industrial and social changes occur. Education should produce the adaptable man and the adaptable society. In a modern industrial nation this concept of education presents industrial or vocational education as an integral and important part of the work of the public schools. The aims, methods, and character of formal education in any epoch or in any given nation can only be scientifically and rationally determined by resort to psychological investigation and to a careful study of industrial evolution aided by accurate statistical information. The basic standard of judgment should be its effect upon the health, efficiency, and intellectual vigor of the youth of the nation. Until educators and school authorities are ready to accept these fundamentals, "groping in the dark" and confusion as to essential principles will continue.

THE INDUSTRIAL FACTOR IN EDUCATION

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According to the plan of the committee the purpose of this chapter is to discuss "the psychological and social need for constructive handwork and for industries as a 'subject' in school." The aim will be to analyze and to state as compactly as possible the various phases of this need as it displays itself in the child growing up thru the school to maturity. The discussion will assume the results of the preceding chapter as to the importance of industries as a cultural force and will leave for the succeeding chapter the history of the theory of industrial education.

It seems, however, almost necessary to preface a discussion of the psychological need for any subject in the school by a comparison of the part psychology has in the past played in the determination of the work of education with the function assigned to it by schoolmen today. The great educational reformers, Rousseau, Pestalozzi, Herbart, and Froebel were convinced that the fundamental need in education was that it should be based on a sound psychology. So thoroly were they possessed with this point of view that they looked to psychology to determine not only the method but also the aim of education. The problem of the schoolmaster they conceived to be a development of that which is potential within the child. In this attitude they were protesting against an endeavor to enforce upon him a number of disagreeable tasks more or less remotely connected with the business of life. Even Herbart,

with his emphasis on the importance of the external process of instruction, agreed that the aim of education is "the harmonious development of all the powers" or, according to his phraseology, the development of "many-sided interest." Education according to this view aims at personal culture, at realizing the self, at bringing to light the possibilities that God implanted in the child; these are all methods of stating the purpose of education which leave to the psychologist the problem of determining its specific character. For who but he whose study concerns the nature of the mind can be expected to know its potentialities?

The theory that psychology should determine not only the method but also the aim of instruction possessed the minds of the earlier advocates of manual training in the United States. Among the important characteristics of the child is the fact that he has a body and is capable of doing an enormous number of things with it. Moreover, he is intensely interested in doing many of these things. For a long time the physical activities are rather more in evidence than the mental ones, and all of the instincts point toward them. Soon the instinct of constructiveness appears, fashioning the form of many games. The teacher, alert to the potentialities of the child, marks the power and the instinct to use the hand, and cultivates it to insure that perfectly developed man toward whom his task is conceived to direct itself.

With the progress of time the ideal of personal culture has been largely modified or replaced by that of efficiency. According to this aim education concerns itself with preparing for life rather than in cultivating all the powers of the child. The study of what man has to do, particularly the study of the social organization into which he must fit, has come to be conceived as the proper method of determining the purpose of education. On this basis the mere fact that a child possesses a capacity is no reason that the school should aim to develop it. On the contrary, many capacities, since they bear no relation to social life as at present constituted, may well be suffered to atrophy. If there is to be education in constructive work, it must be because there is a social rather than a psychological need for it.

Such a need is not, however, far to seek. The growth of industry in modern times has been such as to place it at the very front among the interests of communities and of nations. Science, for many ages merely the pursuit of a learned leisure, has been harnessed and put to work. It has concerned itself with the tasks intrusted to the servile classes. It has relieved their labor of some of its severest strains, has elevated its character, making it more intelligent, and has created the need of a broader intellectual training as a preparation for nearly all the vocations than was required a century ago. If education is to prepare for life, it must begin by preparing to make a livelihood, and the vocations of the vast majority of those whom a democratic society would educate involve forms of handwork and industry in which the school can give an extensive training. Such training is becoming increasingly necessary because of changes in the industrial life that tend to check or to destroy the

apprentice system, and because this life is continually becoming more complicated and difficult to understand without specially directed study. Thus the school is being forced to take up vocational training in a great variety of occupations hitherto prepared for adequately in other ways, for the negative reason that the other ways are disappearing and the positive one that it alone is capable of furnishing a training suited to modern needs.

It is evident, therefore, that, from the standpoint of aiming to prepare its pupils for efficient living, the modern school is more and more compelled to take into account both constructive work and the study of industry as a fundamentally important group of subjects. There is a social need for such work. But in the endeavor to fit it into the course of study difficulties arise. Since the work is commonly recognized as vocational, many parents see no need of it for children who are not expected to pursue the callings to which it is supposed to lead. This is especially true of the constructive work, the survival of "manual training." It finds difficulty in making its way into the earlier part of the curriculum, which is necessarily the same for all. To effect this entrance and to maintain its ground, it has been compelled to assume generalized forms that seem to constitute integral parts in the culture of everyone. Moreover, it has been tempted to defend these forms not on account of their somewhat remote utility, but rather on the ground of the older psychological arguments of discipline and all-round development. If these arguments are, as seems inevitable, to be abandoned, it is evident that the elementary school must find and teach that phase of industrial life that is suited to children and useful for all, and cease to rely on the cultivation thru manual training of such general powers as accuracy, moral rectitude, co-ordination of eye and brain and hand, etc.

Many considerations conspire to make wise the postponement of the more purely vocational part of constructive work and the study of industry until at least the dawn of adolescence. It is specialized work and to introduce such training early seems bad for at least three reasons. (1) It encourages differentiation before the child has revealed himself to others or has discovered his own tastes and aptitudes. (2) It initiates specialization before a child has obtained the general foundations of his culture, and while he is still immature. Many declare that this leads to prematuration and to arrested development. (3) It tries to teach children what can be learned effectively only by older persons and especially under the pressure of practical need. This results in a waste of time.

The problem of constructive work and of the study of industry has thus very quickly resolved itself into one of determining on the one hand the elements of general culture and on the other those of specialization that these subjects involve. This analysis completed, the two factors can be assigned to different parts of the school program. The special training can well be postponed until the work of the elementary school has been finished. The general culture would need to be properly correlated with the age of the pupils and the

general arrangement of studies in the school. Herein the issue comes to involve questions of the psychological needs of childhood.

Before taking up these questions, however, let us note a little more carefully the nature of that general social need at the behest of which the studies in question should be introduced into the elementary school. It is evident that their general utility is not identical with what it has been in the past. With the development of industry into more and more elaborate organizations of highly specialized activities, the all-round manual skill so important in both men and women a generation ago is ceasing to be an especially valuable source of efficiency. On the other hand economic interdependence is becoming greater, and it is growing increasingly important for each to know many things in order to keep his activities socially and vocationally in efficient co-operation with the activities of others in different walks of life. The substitution of economic interdependence for economic independence has made it necessary for each, if he be not to descend into the position of a mere tool of the social machine to be taken up or laid aside at the will of those who use him, to understand the relation of his vocation to others well enough to exert a controlling influence in reference to its status and its development. He must be able not only to readjust himself to changes in his vocation, but to assist in the work of readjusting his vocation to the varying conditions of community life. To do this he needs a general knowledge of many vocations. The world of industry in general becomes of importance to him as well as his own specialty.

It is to the task of laying the foundations for a general knowledge of industrial life that the elementary school must address itself. In this work mere manual training becomes subordinated to the study of industry, as a method rather than an aim of instruction. The group of subjects becomes an introduction to a fundamental phase of economic life and serves a utility quite as definite as that of instruction in the three R's or in geography. Culture having this general aim may well continue after the study of specific vocations has begun. The more effectively it is mastered the more surely, we may suppose, will the trained man be master of his vocation rather than its slave.

Whatever may be the factors in industrial intelligence, it is evident that one is a knowledge of the general facts of economic and industrial life such as enables the individual to see clearly the relation of his own vocation thereto. Upon such knowledge is founded sound judgment as to the rights and duties of each craft as well as of its possibilities and necessities.

We turn now to the psychological problem—the problem of adjusting constructive work and the study of industry to the nature of the child. It may be said of both, and especially of the former, that nature has left the schoolmaster little to do. Children inherit so great an interest in such activity that it, so far from needing aid in order to be made enjoyable, constitutes one of the most effective means of arousing interest in any subject that can be taught thru its assistance. Those educational reformers, who have striven to reorganize education, making it more interesting and more in accord with

the nature of the child, have usually been pronounced advocates of constructive work. We may distinguish between two general uses for which it has been employed: (*a*) to give motive for school work otherwise meaningless and uninteresting, and (*b*) to render more positive and lasting the results of instruction.

As a means of motivation constructive work possesses the following advantages: (1) It appeals to the love of activity, especially physical activity so prominent in children. To younger children the mere making of things seems worth while apart from any uses to which the product may be put. (2) It appeals to the primitive interest in the concrete, that which represents processes and results easily apprehended by both sight and touch and the muscular sense. In such material young children are absorbed, and it is astonishing how little general meaning or value is necessary to insure their interest, provided the material with which they are working be of this tangible character. (3) Constructive work connects itself with occupations and products the utility of which is seen illustrated in the every-day life about the child. Indeed, they are among the first utilities to be grasped by the child's mind.

When we turn to the value of constructive work as a means of strengthening the results of instruction we distinguish two fundamental advantages. (1) It furnishes one of the easiest and most effective ways of applying the principle that learning should, or, as the "functional" psychology puts it, *must* be by doing. (2) It teaches through the application of principles to a sort of practice more nearly similar to that of the life-situations in which these principles are expected to function than is that of much of the school.

The newer psychology takes the ground that we do not attend, do not discriminate, and so are not conscious, except when this is necessary to bring about readjustment between reactions and stimuli. Learning is always connected with the reorganization of our modes of behavior. Apart from constructive work the school presents only one form of physical activity of great importance. This is that of language, either oral or written, and the great aim of such activity is to come into adjustment with certain standard words, notably those of the teacher. Now while such activity must always remain one of the most fruitful occasions for learning inasmuch as nothing can vie with the social situation in offering emergencies for readjustment, it is exceedingly valuable not to be limited in school doing and learning to this sort of thing. The addition of the endeavor to manipulate materials supplies a characteristically different sort of emergency. In adjusting himself to other minds the child is dealing with persons who are continually by their own efforts furthering, or hindering, his endeavors. In either event, the condition of dependence is emphasized. The child is led to consider success or failure to be a matter of the point of view of others; and this point of view may be and all too frequently is dependent upon circumstance and mood, inaccurate, uncertain, transitory, unjust, or absurdly compliant and easy rather than fixed, true, and inevitable. The methods of dealing with minds vary from cajolery and domineering to persuasion and the appeal to the sense of right. In any case they differ greatly from

the dealing with mere physical materials, where there is one law, the mastery of which is the only method of securing results, and where the child can have no thought except that of simple direct control. It is an unquestionable addition to the resources of the child that he has accustomed himself to deal intelligently with physical materials as well as with human minds.

Moreover much that is learned in the school is intended to be applied not in the control of men, but in the manipulation of material. In that event constructive work in the school offers the only method by which the principles can there be applied as they would be in life. That they should get this sort of school application is fundamentally important. Facts learned in order to be recited are, by a simple principle of recall, not apt to be remembered where the circumstances and the emergencies are so vastly different as in the case of school questioning on the one hand and a workshop on the other. The more nearly the school environment corresponds to that of life in general, the more likely it is that the ideas learned in the former will be applied in the latter. The identity of principle is not sufficient with most minds to overcome the effect of diversity in all other associations, and the mind recalls many things, but not that far-away bit of school learning which is the one thing useful. It may therefore safely be said that whatever is to be applied to problems in construction should be learned wherever possible in connection with such problems.

Very much the same analysis that has been made of the psychological need for constructive work in the school applies to the study of industry. In fact it deals with that phase of life to aid in the study of which constructive work finds its principal use. Connecting itself with interest in and imitation of the simpler forms of adult life, it leads gradually to a desire to participate in the work of the world. It is to be hoped that the constructive work and the study of industry in the elementary school will ultimately be of such a character that when the pupil reaches the age at which the activities of adult life make their appeal, he will be able to make a wise choice in reference to them, and be already advanced in an appreciable measure toward the goal of his special vocation.

It is especially in connection with relating school work to the realities of life that the study of industry becomes important. The public in a democratic and commercial and industrial community are apt to find reality rather more in such work than in science and art, literature and philosophy. The children of such a public are prone to discover in the study of industry something that connects the systematic and especially the formal work of the school with the real problems of life. Under these conditions the school finds this study a means of putting motive into many contributory studies and of securing such a setting for its teaching as will make likely its application at least to the utilitarian pursuits of life.

The problem of motive becomes especially difficult in the later years of the elementary school. Children at this time pass, so far as regards their outlook

upon life, into a distinctly different phase of development. We can bring this out by describing the earlier phases. The young child is a creature of impulse and of imagination, absorbed in doing or thinking that which is immediately suggested to him. Reflection is gradually forced upon him. The period from eight to twelve is a critical age, an age of rivalry in games, of the felt presence of social criticism and coercion in reference to all the physical and mental activities that the child puts forth. Under this pressure he becomes reflective. He subjects imagination to standards, the standards of social acceptability, of truth, of propriety. Such standards vary with individuals and social groups. The teacher does not always agree with the parents, much less with the man on the street. Among the children groups arise on the basis of difference in ideals. Later on the adolescent discovers that among these warring views of life he must choose one for himself to be his own. He arrives at the age of independence and becomes himself the critic, declaring his freedom from coercion.

It is at this age that the rate of elimination of pupils from school becomes portentous. The reasons that cause children to leave school are very numerous, but unquestionably a very large proportion, at least a majority, give up because they cannot feel that it will repay the sacrifice of effort or expense or both that it involves. Other reasons are for the most part contributory. This one is fundamental. There are two classes of children to whom school work does not seem worth while. One of these consists of pupils who can and do get on well in the school but find the activities on the outside more interesting and profitable. The other is composed of pupils who do not prosper in the school. Such children naturally grow discontented. No one can be expected to regard as worth while for him that which he is incapable of doing. Moreover, in such a competitive atmosphere as a school merely to pass means practically to fail.

Now it is evident that just as constructive work may offer the motives of activity and the making of concrete things to younger children, so to older ones it, especially when combined with a study of industry, will seem worth while to many of both these two classes of the ordinarily eliminated. For those who fail in the older studies of the school, the constructive work may offer a field for success. For both classes it should constitute the main part of the later school program. As an integral part of the preparation for life, it deserves a place proportionate to the number of those who need such preparation and the amount of such preparation it is possible and desirable to give.

We have reached again from the standpoint of the study of the developing nature of the child the issue of specialized vocational training. It is evident that the general training of the earlier years of the elementary school should be what is deemed necessary to all and what introduces those who are to specialize in some form of industry to their work of specific preparation. We have not, however, as yet considered sufficiently the problem of the initial steps in differentiation or specialization. This problem is in our democratic system one

among the most difficult and important that we face. It is a question whether the problem of determining what the vocation of the man shall be is not more difficult and exacting than that of preparing him for what has been chosen. The European systems of education, which have not been burdened to such an extent as our own with the ideals of a democracy, have found it easy to engraft vocational instruction upon an elementary system intended only for those destined by birth to some form of industry. In our boasted continuous ladder of schools, where the elementary school leads into the high school and the high school into the college, the introduction of special training in industry has not been so simple. It means differentiation. It has seemed like cutting off from the children who took it the opportunity for such careers as were limited largely to those who had completed the higher course. We have felt that education shall give to all an equal chance to attain any distinction in life. Hence we have clung to a system associated with the training of leaders, even tho such a system may be poorly enough adapted to the education of anyone else.

It is likely that we shall find our way out thru a change in our conception of leadership on the one hand and a discovery that our time-honored method of training any sort of a leader needs extensive modification, if not revolution, on the other. It is not, however, the purpose of this chapter to discuss these changes. We may confine ourselves to the crying need for a system of education that shall provide training adequate, in the first place, to enable a fairly intelligent choice of a calling to be made and, in the second place, to prepare for whatever may be selected. We are fully alive to the need for the second of these advances. It is doubtful whether our educational leaders have been in general adequately impressed with the need for a system of school work the primary purpose of which should be to enable the pupil to find himself and the teacher to give to him intelligent advice on the matter.

From the point of view of the development of the child, the age at which this process of experimentation toward a calling should be definitely initiated corresponds fairly well with the beginning of the seventh school year. Its external symptom is the high rate of elimination from school at that time, and its internal sign is the unrest, the questioning of values, the beginnings of "storm and stress" that characterize the commencement of the age of independence, of adolescence. It would seem that at this time the secondary phase of education should begin.

There has been in our country some trouble in defining just what secondary education is. The demarcation between it and the elementary school on the one hand and higher education on the other has been one of years and of studies rather than of general function. There has been no clear reason except custom and a felt convenience for having secondary education begin and end where it does. It is possible, however, to distinguish three well-marked functions of education, which might be assigned to elementary, secondary, and higher education, respectively, without much destructive readjustment of our

present system. Elementary education concerns the essentials and the fundamentals. It is the education that precedes any attempt at differentiation. With the development of the child up into the age where such differentiation becomes necessary an epoch of experimentation sets in. The main purpose of the education of this period should be to afford an adequate basis of experience for the choice of a specialty and to guide the process of selection. Such education we may call secondary. When once it has been determined as well as is practically possible what the child should do, the time for higher education, that is, for the special preparation for a vocation, has appeared.

On this plan we should not have a system in which, while elementary education is supposed to be for all, secondary education is only for a few, and higher education for the very few; but each phase of the work would find representation in the education of all or most pupils. At the beginning of the seventh grade the work of experimentation might well begin. A large number of children have by this time demonstrated their unfitness for what might be called a professional career. For them the severer studies, involving the power of mind to grasp and utilize the abstract ideas and processes involved in mathematics, science, language, etc., are not profitable. They should be given experimental work along the line of industrial training supplemented by concrete cultural work in literature, civics, geography, and science, such as adapts them for the duties of citizenship and social life. We may tentatively suggest that two years of such work would put these children in the position of making an intelligent choice of a vocational school in which to complete their education.

At the beginning of the seventh school year those whose mental traits make it desirable might enter schools where the older type of secondary work is prominent. But we might expect that continually new revelations will be made in regard to the talents and tastes of such pupils, and that little by little those who are unable to do the work that leads to the higher professions will be selected out to enter vocational schools that prepare primarily for intermediate positions in industry, commerce, the civil service, etc. The period of secondary education would, on the theory proposed, extend until the choice of a vocation has been made on the basis of sufficient experience. The knowledge necessary to make such a choice is of necessity more extensive, the more advanced the vocation. Properly speaking, the secondary school would include the present liberal college course.

The characteristic feature of the secondary school on this theory is the emphasis upon experimentation and selection. In such a school the experimental subject would be especially prominent. This may be defined as a subject studied primarily for the sake of finding the extent of its appeal to the powers and interests of the student. Experimental studies therefore should not be elective but prescribed, for their function is to compel, as it were, the student to explore the field of human thought and endeavor adequately before he is permitted to settle upon his peculiar specialty.

An adequate range of experimentation would involve the secondary but by no means unimportant gain of a broad outlook upon life. Thus the student will be getting his liberal culture to a great extent while he is engaged in the process of selecting his vocation. The study of industry and constructive work would thus constitute factors not only in the elementary but also in the secondary education of every student. All children would have enough of them to know and to do the things that they concern in so far as they enter into the life of all. Every student should have enough more such study to enable him, no matter what his calling may be, to understand and to sympathize and co-operate with those whose life-work lies in these fields. The process of differentiation initiated by the completion of the elementary course would still leave to all some further work along such lines both for experimentation and culture. We may assume that when the experimental work has been completed the needs of culture will have been in most cases fairly well satisfied.

The current usage assigns vocational schools of the trade-school or technical-school type to secondary rather than to higher education, where they would be placed according to the classification just suggested. This arises historically because such work is usually taken in lieu of the secondary training of the older sort. The classification made in the preceding discussion aims to provide a basis for the determination of the character and function of constructive work and the study of industry as we go from the age of elementary education on into that of experimentation toward a vocation and further into that of specialized preparation for the one selected. In the subsequent chapters dealing with the work of special schools the classifications of current usage are retained, but, the spirit of the distinctions that have been made in this chapter is embodied.

SOME NOTES ON THE HISTORY OF INDUSTRIAL EDUCATION IN THE UNITED STATES

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Up to the middle of the last century, while American communities were struggling to afford an elementary education to all the children of the country, the question of training for industrial life claimed little attention as an educational problem. Up to the end of this period industrial life was for the most part a matter of small units as to organization, and of small quantities as to production.

Industrial processes were far less subdivided than today and apprenticeship, or some form of training beginners, was far more general. Under these conditions the division of function between school and shop was clearly drawn. The school centered its efforts upon general instruction, and the shop and factory took care of the training of their own recruits. For his subject-matter, the schoolman looked away from the industries rather than toward them; his aim was naturally the organization of a body of instruction of a thoroly general character based first of all on the tools of communication, and extending later to the subjects of literature, history, and science.

During the last sixty years social and industrial conditions in the United States have undergone great changes. To these changes educational ideals and methods have been very slow in adjusting themselves. The old division of function between school and shop built up a persisting conviction that an inherent virtue lies in jealously excluding everything pertaining to vocation from public-school instruction, and led educators stoutly to insist that all such training should be gained in commercial practice, or at least outside of the public schools.

During these sixty years the course of industrial development in this country has been marked by a tremendous increase in the size of productive units and attendant quantity production; by extraordinary division and subdivision of labor; by the steady introduction of machinery, and by the proportionate lessened need of the highly skilled worker. At the same time the methods of the industries have become immeasurably more dependent upon the principles of exact science, and more and more have come to require some need of specialized knowledge on the part of the skilled worker. This development, which has left but few industries untouched, has changed the industrial organization from comparative homogeneity to a situation in which a minority of workers requires even greater skill and intelligence than formerly, and a majority which need skill only in a narrow range of operations.

Coincident with this industrial development, many industrial practices have been taken out of the home life and away from the farm and the village and segregated in the factory. Life in the tenements of the modern city affords few of the manual experiences of the earlier days, so that today the average boy in school is very much farther removed from a contact and knowledge of industrial processes than was the case sixty years ago.

This industrial expansion is confessedly the most important feature of our national economic life during the last half-century; it is the current that is gradually changing us from an agricultural to a manufacturing people and which will in the near future constitute the largest element in our national wealth. During this tremendous evolution both the public school and the industrial establishment have preserved their separateness of function. The school has held in the most part to its original attitude and the shop to its early methods of training. It is only of late years that the steady pressure of economic necessity, and the fact that the old methods of training for vocations have become inadequate, have forced the realization that new conditions demand new methods, and that in the double problem of general and vocational education, once so sharply divided, the school must assume an increasing share, and on the other hand that the shop must borrow some of the methods of the school.

In spite of this general lack of correlation between education and industry the school as a matter of fact has in a number of ways reacted upon the industrial situation.

The first efforts to meet the new conditions resulted in the establishment

of evening schools under private auspices. Cooper Union and the Mechanics' Institute of New York City, Franklin Union and the Spring Garden Institute of Philadelphia, the Ohio Mechanics' Institute of Cincinnati, and the Mechanics' Institute of Richmond, Va., were nearly all founded or opened evening classes during the fifties. The immediate demand upon such schools, and the obviously important results in affording ambitious youth an opportunity to obtain the technical equipment increasingly demanded in their daily pursuits, should apparently have resulted in the early inclusion of such work in public education. That these results did not follow was undoubtedly due to the fact that the spirit of public education was at that time distinctly alien to such work. As a matter of fact, our public evening-school work has limited its scope almost entirely to instruction in language, arithmetic, and other general studies, and it is only in recent years that differentiated and specialized courses relating to industrial needs have been introduced in evening public schools.

The next important reaction of organized education upon the industrial situation was that which took place for the most part in the period of mining and railroad expansion following the Civil War, and which resulted in the establishment of many engineering schools or institutes of technology. The establishment of such schools was at first thru private foundation but the passage of the Morrill Act in 1862, by which large land grants were made to the states for the support of instruction in the agricultural and mechanical arts, resulted shortly in the inclusion of engineering departments in most of the western state colleges and universities.

The development of this type of institution has been widespread in the United States and has produced an institution in some respects superior to anything of its kind to be found abroad. The function of such schools is, of course, to produce the engineering and technical expert, the men needed to design industrial constructions, to devise technical processes, and to superintend industrial production. The object of such schools is not to train workmen or even to develop men of the foreman type.

The first serious agitation for the inclusion of industrial education in the public schools was, naturally enough, when the prevalent attitude of the schoolmen is considered, not for real vocational training but for the inclusion of manual work in the general course of study as an element of culture and general efficiency. The Manual-Training School connected with Washington University, St. Louis, opened classes in 1880 and was rapidly followed by the establishment of manual-training high schools in other cities, some under private foundation but in many cases organized as part of the public-school system.

It was not until the years between 1887 and 1890 that manual training reached the elementary school. Starting with shopwork classes in the upper grades it gradually made its way downward thru the school until it is now represented thruout all the grades in the schools of many cities.

The trend of thought in the whole subject of industrial education is well indicated by the changing conception of manual training as a feature of school work. In the early agitation for the introduction of manual training in the eighties, the claims put forward for the new subject as evidenced in the discussions of the National Education Association, and particularly in the meeting of the Department of Superintendence in 1888, were in the main based on the conception of formal discipline. Manual training was entitled to a place in the school because it exercised the observation, trained the reasoning powers, and strengthened the will.

Altho it is doubtless true that public support of the new movement was due to a vague but sincere conviction that the introduction of handwork stood for industrial training, educators as a rule most carefully refrained from advancing a claim for utilitarian value in the work and all utterances were for the most part expressed strictly in terms of the prevailing faculty psychology.

The practice of manual training in these early days was as barren as its philosophy. The type exercise was the universal form in which handwork appeared. Not until the influence of Swedish Sloyd began to make itself felt in the nineties, with its emphasis on the value of working for a useful end, did a new idea enter into the manual-training conception. Whatever may be said of the limitations of this influence, its effect was at least to make practice more realistic and to bring into methods of teaching the vital principle of interest.

About this same period the doctrine of formal discipline began to lose its place as the cornerstone of manual-training philosophy. By the beginning of the present century the conviction had developed that such work comes into natural relations with the worker only when he contributes something of his own thought to attain the end placed before him.

Out of this attitude aided by a deeper study of the thought of such educational leaders as Froebel, Pestalozzi, and Herbart, and clarified by the emphasis of the psychologists on the unity of the mental processes, developed the conception of manual training as a means of expression, a means of expression in terms of form, color, materials, muscular activity, and concrete ends, a means of expression peculiarly adapted to child life.

During the last five or six years the growing emphasis placed upon the social meaning of education has caused attention to be turned more and more to the subject-matter or content side of manual training and the conception of manual training at least in the elementary school has come more and more to be that of an educational instrument interpreting the fields of art and industry in terms adapted to child life and the limitations of the school.

In the high school, however, neither practice nor philosophy has undergone much change. Halting between the cultural and the vocational aim such schools have increased in numbers but still continue to occupy a somewhat indefinite educational status.

Turning to definite efforts to train workers for the industries in public schools we come to the trade school, the intermediate industrial school, and

the part-time school. All of these institutions are of late development. It is true that the first trade school in the United States (the New York Trade School) was founded in 1881, but in the first twenty years after that date only two important schools giving training in the mechanical trades were added, viz., the Williamson Free School of Mechanical Trades near Philadelphia and the Baron de Hirsch Trade School of New York. To these might be added the Miller School of Albermarle, Va., which gives agricultural and trade instruction in the later years of a course of general education. The existence of each of these schools is made possible by extensive endowments.

Since the year 1901 some ten or twelve institutions that may strictly be called trade schools have developed in different parts of the country under either public or private support as well as a number of commercially conducted schools in the building and other trades.

In 1907 the trade school entered upon the stage of public administration. In that year the already established Milwaukee School of Trades was taken over by the city under the terms of the industrial education law passed by the Wisconsin legislature. Since that date public trade schools have been opened in Philadelphia, Pa., Portland, Ore., and Worcester, Mass.

Such schools are still in the experimental stage. They face grave economic problems that are still unsolved. First among these is the problem of support presented to the student worker during the period of instruction. This difficulty serves to restrict the number that can take advantage of such schools to the comparative few. Training for the skilled trades is in common practice restricted to the period above 16 years of age and as the great bulk of the youth who will form the mechanics and industrial workers of the country must of necessity enter upon remunerative work at sixteen or shortly after, the sacrifices necessary to permit attendance at a trade school can be expected only in cases of exceptional foresight and home conditions above the average.

The second aspect of the economic problem in relation to such schools is found in the large expense of administration, instruction, materials, and physical maintenance in proportion to the number of students that can be instructed.

During the last three or four years a fundamentally different type of school has been much under discussion, viz., the intermediate industrial, general industrial, or preparatory trade school for boys and girls from fourteen to sixteen years of age. Interest in this type of school was developed by the report of the Massachusetts Commission on Industrial and Technical Education made in 1906 in which much stress was laid upon the lack of economic progress experienced by children who leave school before graduation and start into industrial work before the age of sixteen.

Since then the conviction has been growing, not only that the large number of children leaving the elementary school before graduation constitutes a most serious educational and social problem, but that it is a problem vitally related to the whole question of training for the industries. The idea has been gaining ground that one of the greatest needs of industrial education is to

provide a school training for those who expect to enter the industries at sixteen that will give a sound basis of general principles and a wide acquaintance with materials and processes and so make possible the development of industrial intelligence and in consequence of industrial adaptability.

The aim of such schools is not a specialized trade training but such instruction in the processes fundamental to several trade groups that will give an advantage to the boy of sixteen, whether it be to enter upon the work of mill or factory or to take up the task of learning a skilled trade. Schools of this type have been established as parts of the public-school system in New York State at Rochester, Albany, and New York City, and New Bedford, Mass.

The part-time or co-operative school plan is an attempt to combine practical training in a commercial establishment with general and technical instruction in a school. This plan which has been in very successful operation for some years with the engineering students of the University of Cincinnati, has very lately been applied to students of the high-school age.

The details of such co-operative systems seem likely to vary considerably according to whether the student body comes originally from the shop or from the school. In Cincinnati a group of two hundred machine-shop apprentices are being given four and one-half hours of instruction per week in the public schools. In Pittsburg and Beverly, Mass., on the other hand, elected groups of high-school students are given a week in commercial establishments followed by a week in school.

The attempts to develop the part-time plan of instruction have only begun to appear, but it is safe to assume that the great economic and practical advantages of the plan will result in many further experiments in the near future.

On the side of state legislation, the increasing interest in industrial education is reflected in the passage of laws providing a measure of state support and state direction for industrial and trade schools in the states of Massachusetts, New York, and Wisconsin.

This brief résumé may serve to indicate that many American states and communities have committed themselves to the general principle of industrial, or more broadly speaking, vocational education as a part of public education. It will serve to indicate also that while certain types of schools have proven of unquestioned value, others are still in the experimental stage, and that several years of further study and experience are needed to demonstrate fully just what types of industrial education are destined to find a permanent place in the American public-school system.

I. REPORT OF SUB-COMMITTEE ON THE PLACE OF INDUSTRIES IN THE ELEMENTARY SCHOOL

Since a large part of the population, three-fourths to nine-tenths, according to locality, never succeeds in entering any other than the elementary school, three obligations, distinct and somewhat conflicting in the demands which they make upon the curriculum, would seem to be placed upon this school:

1. To develop as much as possible of culture—enrichment of life thru knowledge and appreciation of human achievement in history and art.

2. To give the best possible start toward the life-work in which the person will be most content and most efficient.

3. To furnish the best possible training for citizenship thru developing a sense of social obligation and by preparing for effective membership in the various social groups.

To these might be added the aim of giving to a minority the best possible preparation for continuing their education in higher schools.

Even if the whole effort of the school were given to one of these aims, the results obtainable in so short a time and with pupils so young would necessarily be inadequate, and the more so since the time must be divided, in some degree at least, between the three. They must compete therefore for time and emphasis in the curriculum, except in cases where the material and treatment deemed most appropriate for one is found to be the most appropriate for the others also.

Complete unification in this fashion is hardly to be hoped for. It is, however, the belief of the committee not only that the subject-matter furnished by the industrial arts holds a fundamental place in relation to all three of these aims, but that this material, more frequently than other subjects in the curriculum offers opportunities for realizing these aims conjointly.

As a cultural subject, history, broadly defined, will doubtless be granted the first place in the curriculum. But much of the content of history is beyond the grasp of children. The development of industry is the most concrete and the most clearly continuous aspect of history which can be selected for them, and it is a factor so fundamental in social progress that an appreciation of it may well be made a first aim of the school. Industrial history is also the history of science, and, if in less degree, the history of social organizations. It is, as Dewey says "no materialistic or merely utilitarian affair. It is a matter of intelligence. Its record is the record of how man learned to think, to think to some effect, to transform the conditions of life so that life itself became a different thing."[1] Equally an element of culture, in this industrial age, is some understanding and sympathetic appreciation of modern industry, its methods, achievements, and social significance. As culture, there must be study of the more important industrial materials of the present day, of the processes thru which they pass; of the machines and reagents utilized; and of the two great factors in the continuing progress, science and organization.

From the vocational point of view, it is clear that the industrial arts are equally serviceable. Whether this is to be a major or minor aim in the elementary school the industrial opportunities of the average city are such that an acquaintance with the industries, in addition to that acquaintance with commerce which is already provided for, will be the most promising form of vocational assistance to be offered to those pupils about to enter gainful occupations. This is a subject which concerns mainly the later years of the school,

[1] *Elementary School Record*, p. 200.

rather the elementary period as a whole, and may be most appropriately discussed as special work for the grammar grades.

The bearing of the industrial arts upon citizenship, and upon general social effectiveness other than economic, is a topic which leads somewhat away from consideration of subject-matter as such. Training, as well as knowledge and information, is a factor in the development of a proper social attitude and spirit, and tho modern psychology which has shown that confidence in many of its forms and methods has been misplaced, training and discipline still remain a fundamental aim of the school; the main difference being that the discipline is now being brought as close as possible to the special field in which it is expected to do duty. If general training is a myth, particular types and lines of training are the more essential.

The problem of training for citizenship, therefore, becomes that of placing the child in an environment which permits and demands the exercise of citizenship, and the greater the resemblance between his present and future fields of citizenship, the more effective the training secured.

It is generally recognized that the conventional school life, while developing certain social habits of importance, is yet a very artificial type of social experience, when compared with the life outside. The argument here for the study of the industrial arts is simply that, since it may be carried on not merely by textbook or recitation but by actual reproduction of their processes, it may furnish the pupil rich social experience, more genuine and closer perhaps to that of the outside world than the school can offer him in any other way.

The line between the purely social and the economic values in such training is naturally difficult to draw. Such experiences in production should not only develop a social adaptability, thru the working over, under, and with others, but should also habituate pupils in a degree to such planning of work, estimating of cost, and economizing of materials, as the outside world will eventually require.

It is apparent that the study of industrial arts here contemplated includes much more than the various lines of handwork which have already found lodging within the curriculum. "Manual training" as its name indicates was introduced as a means of formal discipline and the place which it has made for itself is well apart from its relations to the industrial life. Taken in hand by students of child psychology, it has been made to appeal effectively to children's motor and imitative instincts, and to serve as a means of comparatively spontaneous expression. It has also been made to furnish some concrete applications for other school work in mathematics, science, or art. Its effectiveness in these respects probably justifies all the recognition which it has received. But such work may be, and often is, carried on successfully from these points of view with only the most incidental reference to the industries as such, and without developing any generalizations regarding them; and so much has been made of its value as a *method* of securing either manual skill or free expression that the question of its *subject-matter* has often been ignored.

It is only of late years that the significance and meaning of the industrial arts as social subject-matter has had attention, and it is a fair assumption that the present curriculum shows only the beginning of the recognition which this aspect is destined to receive. Following this there may be expected a proportionate increase of emphasis upon actual constructive work, which will then have place in the school life not only as an appropriate means of expression but also as experience thru which fuller understanding of the nature and significance of the industries may be gained.

THE WORK OF THE PRIMARY GRADES

The younger the pupil, the greater, of course, are the limitations under which the school work is conducted and the more of attention to be given to method as opposed to subject-matter. Without denying that the later school years are concerned with the doctrine of interest and the conception of education as expression, it is clear that the earlier years are the ones most directly concerned from this point of view; in the primary grades special attention is to be given to the reactions which are secured from children and that these depend largely upon the appeal which is made to their native instincts and impulses.

Numerous studies in the psychology of childhood have combined to emphasize the significance of the motor impulses during this period, and the strength of the interest in concrete materials. They need not be quoted here. Our present problem is, recognizing fully the importance of an education during these years that shall "start from the child," to see in what ways the concrete and motor work may "lead into society"—how to give social content to these spontaneous interests and activities.

First may be noted an important element of value available from almost any form of "manual training" quite apart from any direct relating of this to the industrial arts; i. e., general acquaintance with the qualities of common materials, their measurement, and their manipulation. This will at least have value as a foundation for the work of the later school years. However, if the handwork be centered around the fundamental industries pupils may gain two further types of knowledge and experience:

1. Knowledge of the nature and operations of the industries upon which their own lives are most immediately dependent.
2. Knowledge of the history of these industries and the course of their development.

The relative value of these two types of subject-matter for the primary-school period is a question much discussed and with no general agreement as yet. Upon the decision here depends the choice between what may be called the neighborhood approach and the evolutionary approach to industries.

In taking the neighborhood approach, the pupils would be led to the observation and reproduction of the activities which they see to be meeting their own immediate needs, such as those of bakery, truck-farming, or house-building. Other industries having special local prominence would come

in even tho their service were of a less fundamental nature. The evolutionary approach, on the other hand, would select the most fundamental industries, and would produce first the earliest and simplest processes, following in order the steps of their development toward the complex forms of the present time.

Each plan has obvious advantages. For the neighborhood approach it is to be said that—

1. It takes the child exactly where it finds him, dealing with his actual and immediate environment and thus avoiding the difficulties of creating an imaginary environment as a theater for his experimental work.

2. In the progress of the work the reference is constantly to near-at-hand processes which are to be seen in the large by the children individually and in class excursions.

3. This constant combining of productive work with observation will develop a habit of attention to the facts of his environment and will be the quickest and most direct means of increasing his appreciation of its activities.

For the evolutionary approach it is to be said that—

1. The child meets the industry reduced to its lowest terms and deals in the first place with its bare essentials, thus avoiding the confusion likely to accompany study of the complicated modern processes.

2. Thus simplified, the reproducing of an industry demands reinvention by the pupils of the successive improvements in the processes—effort more original and more educative than mere observation and imitation of processes seen around him.

3. It involves a grounding in the elements of industrial history which will not only furnish an important background for the appreciation of modern industry but also serves well as a basis for the interpretation of other lines of historical work.

Most current practice could be shown to combine these two plans, at least in some measure, so that the question is really one of relative emphasis. It is recognized that the very beginning must be with the immediate environment, and also that at some point attention must be given to stages of development which have preceded. Some, however, hold that the child on leaving the kindergarten should be sufficiently prepared for the transition backward; others would postpone it until three or four years later. Some again advise going back to the cave-dweller, and others no farther than the colonial period. All these variations need to be much more fully tested before a course of study at all authoritative in these respects may be offered. In Appendix A will be found more specific suggestions for courses of study realizing some of these possibilities.

THE GRAMMAR GRADES

The final aim in the study of past stages of industry is of course to prepare for the fullest appreciation of those of the present. Children twelve to fourteen years of age are entering the stage of analytical and discriminating interest in the social life about them. The daily paper receives attention, and current events are discussed. The group game with its demands for organization is much in evidence. Free constructive work tends to concern itself with articles for actual use or with the building of mechanical models very closely imita-

tive of the originals, and embodying all of their more fundamental mechanical problems. The impulse toward reality repudiates the toy play and doll play of previous years and also, in many cases, feeds the impulse to leave school and get to work. The whole situation makes strong demand for an intensive study of present industrial methods and practices.

This situation, in the view of a majority of the committee, demands sex-differentiation of work at this point: for boys, toward the larger industries; and for girls, toward the household arts. All admit important social-ethical values in giving to either sex a clear appreciation of the nature and requirements of the work done by the other. But now that the work of the average pupil is beginning to have significances to him thru a recognized relation to his own future, it becomes difficult to secure a feeling of reality in connection with the work of the opposite sex. Further, at least for the large majority who will have no secondary education with its opportunity to specialize, it is probable that the time would be better spent in broadening the pupils' view of their own distinctive fields.

Assuming this separation then, there is still much difference of opinion regarding the aim and purpose of each type of work. The question of vocational education in the elementary school is one much under discussion at the present time, and its advocacy is calling out emphatic protests against departure from the more general aims which have until now obtained in the elementary curriculum.

Upon this question the committee would submit the following theses:

1. Vocational education, if defined in the narrow sense as training for efficiency in some one specific occupation or industry, is not appropriate to the twelve- to fourteen-year period. Given at so early an age it could not avail either to increase appreciably the pupils' earning capacity or to shorten the period of apprenticeship. Further it would presuppose choice of vocation, which clearly should be delayed until later, in as many cases as possible.

2. It is entirely practicable, within this period and within the limitations of the elementary school, to give such notions of leading industries as shall be of large assistance toward the proper *selection* of a vocation, or in the case of those destined for high school and college, toward the proper *selection* of a higher school.

3. Whether precedence be given to this semi-vocational aim or to a more distinctively cultured one, i.e., general appreciation of the pupil's social-industrial environment, the subject-matter and the methods demanded will be much the same for pupils of this age, and the practical suggestions later to be offered will be equally appropriate.

The cultural values of such work are clearly of importance to all classes of pupils. The boy destined for a profession needs experience and knowledge that will make him appreciate the factors of industrial life. The one destined for a highly specialized industry ought to have such acquaintance with other types as will show him his own in a proper perspective. At the same time, work and study that are well adapted to give this acquaintance can hardly fail to be of material assistance in the *choosing of an occupation.*

It is doubtful whether this latter service and the need for it is fully appreciated at present. The situation may be stated briefly as follows: a large

majority leave school at about fourteen years of age, and of these again a large majority are certainly to earn a living with their hands. Ordinarily the school has emphasized the commercial side of life in a way to send them out with a strong bias in its favor. Few have any opportunity even to observe the various types of industrial work; so that the selection of an industrial occupation, as shown by the report of the Massachusetts Commission, is very largely a matter of chance. The desirable trades have a long apprenticeship term, are not available before the age of sixteen or seventeen years and have an initial wage lower than that of the many juvenile employments. When the boy reaches this age he is naturally reluctant to accept the reduction in wages, but even if he has the foresight to accept this sacrifice, his work of the previous two years, whether in office or factory, has neither trained him for more skilled work nor has it in any noticeable degree clarified his ideas regarding the types of work for which he is adapted. His school work in manual training, to be sure, may have given him some notions about his suitability for woodworking trades, which is valuable so far as it goes; but these trades now include no more than a tenth of the more desirable openings, and even tho he has proved an entire failure at cabinet work, he may yet have in him the making of a good plumber, foundryman, electrician, or even machinist—the requirements of each being so fundamentally different. Industry has now become so varied that success or failure in any one line offers little evidence regarding one's probable success in others. Thus all the factors in the situation conspire to bring him into the ranks of the casual, rather than of skilled labor. Any other outcome will be due to happy chance or to exceptional foresight and determination on his own part or that of his parents.

Three general methods of attack are available at this point:

1. That of the intermediate industrial school. This would offer a curriculum devoted primarily to the industries and their processes, with the academic work closely related to these. It would be open to pupils from fourteen to sixteen years of age and should do much toward making these "wasted years" subserve educational ends.

2. A readjustment of the present manual-training courses in such ways as to give more varied industrial knowledge and industrial experience.

3. That of the special industrial class within the elementary school. This would require a much larger time-allowance for construction work; permitting a more intensive industrial experience for the pupils specially in need of such opportunity. It would serve in short as a substitute for the intermediate industrial school in localities where the establishment of such a school is not found practicable.

The first of these three topics is treated at length in another chapter of this report. The second and third are the subjects to be considered respectively in the two following sections.

INDUSTRIES IN THE MANUAL-TRAINING COURSE

The limitations of the school present serious obstacles to this type of work, if undertaken in a broad way. Some discussions of the various methods of treatment may, therefore, best precede that of the appropriate industries for

study. Three general modes of treatment may be distinguished, the first at least, that of discussion, being always available. It should of course include constant use of photographs, illustrations in trade papers and popular magazines, trade catalogs, etc. Attention should also be given to its social and economic aspects; wages, hours, seasonal fluctuations, length of apprenticeship, etc. Much may be accomplished by this means alone, assuming adequate preparation by the teacher, in bringing to the pupils a conception of the meaning and methods of a given industry.

The second method is that of the class excursion, nearly always avialable in the case of local industries, despite popular opinion to the contrary. It has been the experience of many that practically all manufacturers will, if the matter is clearly set before them, permit a properly conducted class excursion thru their works, and that many of them come to take a strong interest in the plan. The value of such an excursion depends very largely upon the discussion and study which has preceded it. If this has been neglected the pupils will often become confused by the complexity of the plant and the trip degenerate into a mere vague gazing about. But properly prepared for, it becomes a means of fixing in a most vivid way the fundamentals of the process and of acquiring a very much more rounded and complete conception of the industry than could be secured in any other way.

The third mode of approach is the reproduction of the industry or some of its more fundamental processes by the pupils themselves. This, while not always practicable is a most desirable conclusion of the study. Actual feeling of the materials will produce many phases of appreciation, which mere observation fails to develop. It is this treatment also which will count for most in the discovery of special interests or aptitudes in individual pupils, and will, probably, have the most direct influence upon their choice of vocation. It is to be assumed that the processes reproduced will be greatly simplified, that the product will usually be upon a much reduced scale, and that much of the workmanship will be crude. It is sufficient that the pupils view it with a sense of achievement and that its processes reproduce those of the industry in a typical rather than a merely imitative way. In studying carpentry, for example, the framing of a model house from laths might be called a fairly typical treatment, while the making of a cardboard house would be a purely imitative treatment, having little value outside of the primary grades. The imitation, in other words, must be in structure not simply in appearance.

SELECTION OF INDUSTRIES

It is clear that of the many industries which demand attention comparatively few can be treated in this fashion within the available time, so that selection becomes a difficult and important matter. Five considerations which bear upon this choice may be noted in the order of their importance:

1. General importance and extent of the industry.
2. Local importance.

3. Dependence upon a distinct and comparatively high type of industrial ability.
4. Desirability as an occupation.
5. Practicability of reproducing its processes at school.

The relative importance of local industries may be ascertained from the *U. S. Census Report*, which shows, for each city, the number of persons employed in the various lines of work. (Vol. "Occupations," pp. 550 ff.). The rank of the more prominent ones is well shown for the country as a whole in the chapter of the present report upon intermediate industrial schools (pp. 59-80). The grouping of industries there indicated is suggestive for our present purpose; but the number of topics indicated is much larger than could be treated within the elementary school, at least in the intensive fashion which we are at present considering. The number of topics must unquestionably be reduced to six or eight. This may, if necessary, be done by the outright selection of the most prominent and the most individual, a plan which would not be wholly discredited by the fact that these industries represent only a minority of the industrial occupations. However, the effort should be made to recognize any similarities which exist and, by the selection of type industries and of those most divergent in nature, to make the scope of the work as broad as possible. The classification just referred to is suggestive in this regard but still contains too many topics for treatment by the elementary school.

The following rearrangement of groups may meet this situation in a degree:

Group	Trade	Number of Males Employed
I. Building trades	Carpentry	600,000
	Woodworking	350,000
	Masonry, stoneworking and concrete construction	220,000
	Painting and glazing	270,000
	Plumbing and pipe-fitting	100,000
II. Metal and machine trades	Structural ironwork	100,000
	Foundry work	100,000
	Machine-shop work	280,000
	Blacksmithing	220,000
	Engineers and firemen	400,000
III. Machine-operating trades	Weaving of textiles	250,000
	Clothing manufacture	170,000
	Shoemaking and leather work	200,000
	Other metal working	80,000
IV. Electrical work		100,000
V. Printing		140,000
VI. Agriculture		9,000,000
VII. Mining		500,000

A classification so general must be far from satisfactory. Thus the building trades have very little in common on the purely technical side; plumbing, pipe-fitting and structural ironwork are intermediate between Groups I and II and about as appropriate to one as the other; engineers and firemen and many printers belong technically to Group III, etc. On the other hand, it would seem that relations among the building trades are so intimate that any serious study of one would lead to measurably clearer notions about others; that the structural iron worker is, on the whole, more nearly related to the machinist

than to the builder; and that engine operators also require much of the machinist's equipment.

Upon the basis of the five considerations already mentioned, each "group" would seem entitled to a place in the curriculum and in the order named, barring special local conditions. Each should be studied by means of at least one of the subordinate industries; more, if possible. Each, however, of the first four at least is held to outrank any one of the included trades; e.g., the course of study should not undertake a second or third trade under the building or machine industries until it has assigned some place to electrical work.

The building-trades group being so populous, and representing so dominant a proportion of skilled labor, seems clearly entitled to first place, and the large number of woodworkers goes far toward justifying the usual manual-training course from the present point of view. If but one industry is to be dealt with, clearly this is the one. Yet it is doubtless in some senses a waning industry and it would not be surprising if the approaching census reduces its preponderance materially.

In Group II the machinist certainly has first place, not because of the plurality indicated, but because his work and his knowledge are fundamental to so many other industries. Technically he is a builder of machines; but this involves some ability as a metal worker combined with some understanding of machinery in general, its adjustment, alteration, and repair. Men with such equipment, whether nominally machinists or not, are to be found in any type of industrial establishment and are the ones whose special talents gain the promptest recognition and advancement. Two aims should characterize the school work at this point: (1) to give the general notions of the processes in the building of machinery; (2) to study and, so far as practicable, to construct various mechanisms with a view to the development of mechanical ingenuity. The taking-apart and reassembling of any mechanism, the construction of any mechanical project or moving toy and experimenting with various adjustments to secure its proper operation—all of these may be expected to increase the pupil's understanding of machinery and to disclose and develop any latent mechanical talent which he may possess.

Group III, that of machine-handling, is seen to consist largely of what may be called semi-skilled industries, which command a wage distinctly better than that of the common laborer but below that of the journeyman mechanic. The ability here required is ordinarily that of deftness or speed in the operating of a machine rather than any thoro understanding of the machine itself.

The question of what special types of education, if any, will be advantageous to the very large number of pupils who are destined for this group, is doubtless the most difficult one of all.

What may be done for the person who is confined to a single process in an industry or a small part of a process? Clearly a perspective view of the industry, from the sources of its raw materials to the social functions of its product,

is one of the first services required, and this should doubtless be the foremost aim of any attempt to deal with these industries. Further, any work leading to the better understanding of machinery, such as has been suggested for the previous group, will have value from two viewpoints: (1) It will have a selective influence, encouraging the more capable operatives to rise above the rank of operative. (2) For the operatives who are to remain such, this would hardly have the same practical value; but the ability of these to understand and appreciate the mechanism of their machines ought surely to mean a much more intelligent interest in their work and much more satisfaction in its conduct. It would appear then that the treatment of this group of industries must be very largely cultural in its purpose.

The electrical industries while employing fewer men are considered as a separate group for several reasons. Electricity is a factor which no cultural survey of modern industry, no matter how elementary, can possibly ignore, and on the vocational side two special factors require its emphasis : (*a*) It is constantly becoming a more significant factor in the fields of the leading industries, so that some acquaintance with its theory and applications is of practical value to many times the number listed in the census as regular electricians. (*b*) It demands a unique type of ability both mental and manual—an ability frequently discovered in pupils whose progress in many other lines is unsatisfactory. This is one of the industries in which study by actual reproduction is most available, since the construction, alteration, and operation of simple bells, motors, telegraph sounders, etc., is fully practicable at small expense in the usual school shop, and is a type of work well calculated to develop a general conception of the nature and application of electricity.

Brief reference may be made to the remaining groups bracketed above because of special difficulties involved in centering the school constructive work upon them.

Printing, like electrical work, is classed as a group rather than as a trade because of its marked individuality and the fact that it has so little in common with other industries. It is of the last three the most feasible in the school, altho requiring special equipment and also, possibly, smaller classes, tho further experiment is necessary to prove this fully. The school can of course make use of a great variety of printed matter and this is apparently the one point at which industrial work may be carried on in continuous service of the school as a whole, and one which should therefore have special value as a socializing influence. That it could be in so large a sense a regular industrial enterprise, conducted by the school, should give a peculiar sense of reality to the whole process and particularly to such considerations of cost of supplies and economy of materials, which in the usual types of constructive work must be developed in a somewhat artificial way if at more detail.

That agriculture occupies nine million men shows in how great a degree this is still a farming nation. Unquestionably the city school as well as the country school must find means for its presentation, but it is usually considered

apart from the lines of industry already discussed and space does not permit its detailed consideration here.

Mining is also seen to be of high rank numerically and it is in many aspects worthy of a place as a skilled industry, but it is so highly localized and so difficult of reproduction in the school in any typical aspects that it would not seem available for treatment except in the most general way.

In the treatment of any of these industries it is clear that the school work should aim consciously at developing a comprehensive view of the industry as a whole, and some appreciation of the value of this may be counted on from the pupils, tho continuous attention to these aspects cannot be expected from children of this age. Almost any manipulation of the materials involved will be of assistance here, but very few industries have sufficient fascination in their mere processes to secure the most desirable quality of attention and interest from the pupils. This is ordinarily dependent upon the securing of a product embodying in a vivid, concrete way the knowledge and technique that has been acquired; such product to be a unity, a project complete in itself, not simply a series of exercises or experiments. Thus in the case of carpentry, the framing of a model house would be appropriate; in the case of concrete construction the erection of a model building or possibly the laying of some sidewalk on the school grounds. If in addition the product is usable as a toy or otherwise, so much the better; e. g., in studying the strength of materials a bridge would be good but a multiplane kite possibly better. Similarly in electricity a motor would be good, but an electric motor boat better.

This whole field, however, is one in which the school is just beginning to feel its way, and until the results of much further experimentation are available, details of method may be suggested only in the most tentative way. The one certainty is that the content of the industrial arts is such as to demand a much more serious exploitation on the part of the elementary school, and that fuller knowledge of this content will be an important influence toward the better after-adjustment of pupils to their industrial environment.

(Appendix B contains more detailed suggestions regarding work of this type.)

SPECIAL INDUSTRIAL CLASSES

However, even with the fullest development of the industrial element in the regular course, the educational needs of a large percentage of the pupils will not be met. This is especially true in the cases of those pupils who do not readily respond to our usual methods and who, therefore, do not progress regularly from grade to grade.

These pupils leaving school at fourteen, especially when they leave from the lower grades, are unable to secure occupation which promises regular and satisfactory advancement. These workers, entering as they do into unskilled or into highly specialized industries where the subdivision of processes is minute, require for their own well-being and for the benefit of their employers a general rather than a specific industrial training.

For these reasons it is extremely desirable to introduce special industrial classes in connection with the regular work of the last two or three years of the elementary school, that will appeal directly to the above groups of children and occupy four or five hours a week.

In order to make the best adjustment and to secure the best results from such classes, it will be necessary to institute a variety of experiments—experiments that may be as varied as the size of the school system permits. These experiments should be governed to a considerable extent by the varying industrial conditions prevailing in the different localities and should connect with the other work of the school at as many different points as possible.

Such special classes give promise of doing much to solve the problem of the backward or non-progressive pupil, the problem which conscientious and thoughtful teachers have ever taken seriously to heart.

Another type of special class might deal even more specifically with individual pupils just on the point of leaving school, occupying perhaps two or more of the afternoon school sessions per week. Pupils taking this course would continue for the remainder of the time in the regular school classes, the work there being so arranged that they would drop certain subjects entirely rather than parts of different subjects. The more fundamental subjects would naturally be confined to the forenoon and in these no distinction between regular and special pupils would be required.

Admission to such a class might be limited to pupils fourteen years of age, or those on whom the school has no further legal hold. It would obviously interfere with entrance to high school, and should presumably be placed before the pupils as an inadequate substitute for a secondary course, none being admitted except upon evidence of inability to afford or profit by the conventional high-school course and upon written consent of parents.

The work of such a class might deal with a small or a larger number of industries according to local conditions and requirements. In either case, however, with such a time-allowance it could clearly be much more thoro, systematic and technical than that of the regular manual-training courses. It might well be expected not only to give a semi-vocational preparation to a considerable number of the more mechanically minded boys but also to lengthen materially the terms of their school life—in which case both the industrial and the academic work secured would be for the pupil just so much clear gain.

FURTHER SUGGESTIONS REGARDING COURSE OF STUDY

It has not been found possible to offer a complete course of study representing any phase of the work which has been discussed. The following pages therefore deal with isolated topics only with a view of illustrating certain types of treatment available for a study of the industries.

In order to make this material as practical as possible in its suggestion, it

is confined for the most part to an account of work which has had actual trial within the schoolroom. As has been suggested earlier, there are various lines of constructive work which deserve place within the school from the viewpoint of the child's immediate interests and requirements, but are without direct bearing upon the industries. These are omitted here as lying outside the scope of the present discussion.

A. STUDIES OF INDUSTRIES IN THE PRIMARY GRADES

1. THE EVOLUTIONARY APPROACH

First Example—Study of the Textile Industry[1]

(Second Year, Horace Mann School, New York)

The work centers about the main lines of thought during the year, in connection with the study of social occupations as they are found among the pastoral and early agricultural peoples. As these types represent very simple conditions, the activities are still largely those involved in the securing of food, clothing, and shelter. The study of the first grade forms a basis for comparison, and aids in the solution of similar problems under new conditions.

In the pastoral stage the domestication of animals, especially sheep, determined very largely the life and occupations of the people, and greatly enriched their sources of supply, particularly that of clothing. The child brings with him into the second grade a vivid picture of the dress of the primitive hunter. He has learned that he used woven grasses, leaves, and skins for clothing. He remembers that the skin garments were very hard to prepare, and that the cloth of woven grass and rushes was not strong nor soft, nor close and fine like his own clothing.

The children are now given pieces of silk, cotton, and woolen materials, and some raw wool from a fleece. By the sense of touch and examination of the raveled threads they decide upon the woolen cloth as being of the same material as the fleece. They are asked to find out which articles of their clothing are made of wool, at what season we wear wool, and to name other things made of wool. Having traced the woolen materials back to the wool, they are ready for the study of the sheep. They are then taken to Central Park, where they see the sheep in flocks. They notice the shape of the body, head, legs, and tail; his manner of moving and feeding, and his way of giving alarm. Memory sketches are made on the return to the classroom. In the lesson following, a fleece is shown and by examination the children notice where the wool is thickest and softest, where finest, and where coarsest. Different methods of shearing are discussed, and the old way compared with the new. Pictures help very much. Each child cuts a handful of wool from the fleece and examines it very carefully. One child discovers that it feels oily, another that it is not white, another that it is full of burrs and sticks. It is decided that it must be cleaned before it will be ready for spinning. They try cleaning by hand, but this method is decided to be too slow. Some one suggests washing. While talking, some of the children try to twist the fibers with their fingers and usually succeed in producing some short, uneven threads. This gives them a chance to imagine how the pastoral women must have started their spinning. Then they try to use their pencils to wind the thread. and suggest that sticks of some kind might have been used long ago for this. Gradually by getting used to the motion they are able to keep the pencil with the threads whirling, and the idea of the spindle is evolved. These are made of wood by the children and they spin a short length of the coarse wool.

As they decide to wash the wool, tubs of warm water and soap are brought to the classroom. They discover that much energy makes the wool mat together. They also discover that the oily feeling is gone, and that it does not spin as easily. The question now

[1] *Teachers College Record*, Vol. VII, pp. 344–47.

arises as to the best manner of getting the matted condition smoothed out, and finally combing is suggested. It is found that combing with the fingers is not a success, and that even the ordinary comb does not seem strong enough, so it is decided to make special carding combs. These are made of wood 4″×9″. The children use rulers, knives, hammers, and nails in construction. Four rows of nails about ½″ apart complete the comb.

The children tried a few experiments with dyeing in their Indian work, so they are asked to suggest vegetables, berries, or roots that might give color to the wool. Such things as grapes, tomatoes, beets, onions, squash, poke berries, and blue-berries are usually tried by the children. They cook the vegetables and crush the berries, and dip the wool only to find that most of the colors will not hold. Out of all the materials tried they find only a few, such as grape skins and tomatoes, that are satisfactory in giving a fairly good and fast color.

In the first grade the children had woven grasses on a rectangular frame making use only of their fingers. They now construct a somewhat similar frame and study various methods of securing the finer woven warp thread to the two end-pieces. For the woof they use a manufactured yarn of different colors, blue, brown, black, and white. With this fine material the great length to be pulled thru each time proves very awkward, and discussion of some way to relieve the difficulty develops the idea of winding the entire weaving thread on a small stick, thus producing a primitive shuttle. After some further work the amount of time and labor required to raise and lower the individual warp threads becomes very evident, and the advantage of some means by which a whole set of alternate threads may be raised or lowered at one time is apparent. After much study and after some suggestions and experiments several forms of string heddles are developed and put into use.

It is decided that the rugs to be made will be more attractive if several colors are used, and a study ensues as to the easiest and best way to arrange the different colors. Stripes are decided upon, and a few suggestions are placed on the black-board, discussed, and compared. After this each child decides upon his color scheme, and draws a pattern for his rug, which he carefully follows in the weaving. As a result there is much originality displayed, and a great variety in the productions made. This work occupies the principal part of the first half-year, and in connection with it visits are made to the Natural History Museum, and to the Department of Domestic Art in Teachers College, where illustrations and demonstrations of the different processes are seen. The modern methods of carrying on these same processes are also touched upon. As there are no factories in the immediate neighborhood which can be visited, most of this work is illustrated by means of pictures enlightened by the experiences of children and teacher.

Second Example—Candle Making in the Third Year

(Francis W. Parker School, Chicago)

An illustration of how the study of an industry may be combined with the meeting of a present social need—in this case the making of candles for a Christmas tree.

The first thing to do was to choose the material of which the candles were to be made. Wax, paraffin, spermaceti, stearin, and tallow were shown to the children. Spermaceti and stearin were excluded on account of expense. To help in making a choice of paraffin, wax, or tallow, candles of each of these materials were burned. The paraffin flame was the largest, and that material was the one chosen.

How to make the candles was the next question. One of the boys said his father had read to him of boys making candles in bamboo canes. This idea was quickly taken up by the children and modified in various ways.

The children were asked to work out their plans at home. The result was candles made in five different ways.

One was made in a paper mold. A piece of heavy paper had been wrapped around the handle of a duster and the edges of the paper glued. Darning-cotton was used as a wick

and the tube stood upright in a low tin can, being held in place by paraffin that had solidified around the tube. Paraffin was poured into the mold—the mold, of course, having to be broken to release the candle. Another was made in a bottle, and another in a wooden mold.

A wooden mold was made from a block 7×2×2. A half-inch hole was made lengthwise, almost thru the block. The block was split, and the two pieces fastened together with hinges and a clasp. (Help had been given in putting on the hinges and clasp.) A piece of string was used for the wick.

Another candle was made by dipping a piece of string in and out of wax repeatedly; another, by rolling paraffin, partly warm, around a string.

We liked the size and appearance of the dipped candle, and thought, too, that it was the easiest of the five ways shown for making candles; so it was decided to make the Christmas-tree candles by dipping.

Five pounds of paraffin were melted. Three wicks were tied to each of two sticks, nails being tied to the wicks to make them sink easily into the paraffin. These nails were cut off as soon as the paraffin stiffened the wick. Two dozen candles were made in this way.

The children thought they would like to make candles for home, so we planned to make larger candles, and candle-sticks of clay to fit them, as Valentines or Easter gifts.

The children were shown some tin candle molds. These they thought would make nice candles of just the right size. To the paraffin for these candles was added some stearin to make them harder. A candle made of paraffin alone will bend in a warm room.

The children drew plans for their candlesticks. They were then shown some simple candlesticks of good design, and their second plans were better.

Many wished that the candles might be colored. Green is the only color we have managed successfully. This is made by dissolving green and yellow aniline dye in stearin.

The candlesticks for the green candles were glazed green; for the white candles blue.

2. THE NEIGHBORHOOD APPROACH TO INDUSTRY

Third Example

(Plan of work in the University of Missouri, Teachers College)[1]

Acting in accordance with this view the Elementary School at the University of Missouri is using the following curriculum: In each of the first three years the playing of wholesome games, the observation of anything interesting and profitable to children, and the making of things useful and ornamental. In the fourth year, local industries, as found in the blacksmith shop, the post-office the laundry, the grocery store, the meat-market, the dairy, the shoe factory, the farm. In the fifth and sixth years, industries at large, such as fishing, lumbering, mining, manufacturing, transportation, government. In the seventh year, the development of important industries, especially within the United States.

In pursuance of such a course the three R's, language, drawing, geography, contribute what they can. A bit of handwork in the making of a calendar by the first grade just before Christmas is much enriched by a personal account of the making which is read by the pupils. Further, it is the occasion for writing, number-work, artistic decoration, language. The simple game of tossing bean-bags into concentric circles on the floor is a wholesome occupation and greatly ennobles the social instincts. The game itself is much enriched by the oral discussion on how to play, by the reading of a personal account of the game, by the number-work involved in keeping score, by drawings illustrating the game.

Further illustrations would show all the formal studies in the first three years wholly

[1] From Fundamentals in the Elementary School Curriculum, by J. L. Merriam, *Ed. Rev.*, April, 1909, pp. 396–97.

subservient to real activities in wholesome games, profitable observation, and useful handwork.

In the fourth grade a study of a local dairy—occupying ten days—includes the following: (1) an excursion of three hours, (2) reading from twenty references, (3) thirteen compositions amounting to twenty pages, which include (4) forty problems with additional drill exercises involving the four fundamental processes, fractions, United States money, liquid and avoirdupois measurements, (5) chemical experiments in the souring of milk, (6) handwork in the making of butter and cottage cheese, (7) science work in the study of various kinds of cows and the care of them, (8) sentence-structure to make clear their own compositions, and (9) seventy-four words liable to be misspelled. All these various "studies" serve as means in the study of the larger problem, that of the dairy as a local industry. This is a type of the work done by the fourth grade in one year's work on local industries.

In the fifth grade the lumber industry is given twenty-five days. It includes the following work: (1) four excursions to a forest, a sawmill, a planing-mill, a lumber-yard; (2) readings from eighty references, (3) eighteen compositions covering forty-two large-size pages, (4) twenty-three concrete problems, involving the four fundamental processes, square measure, board measure (in both this country and foreign countries), common fractions, decimals, percentage, and considerable drill exercise in all of these topics; (5) geography of almost every country on the globe, with the maps carefully drawn; (6) science work on trees, lumber, other forest products, sawmills, etc.; (7) drawing in twenty-two illustrations; (8) literature in both poetry and prose fiction.

It needs but a little study of the manufacture of cotton cloth, for example, in the sixth grade, to call for much arithmetical work, geographical data, studies in science, drawing, reading, etc.

Fourth Example—Garden Work

(Francis W. Parker School, Chicago)

The garden of the Francis W. Parker School occupies a plot of ground one hundred and twenty-seven by fifty feet, some fifty feet east of the building. The area is well adapted for the purpose, being open on all sides and shaded only at the southeast corner by some tall cottonwood trees.

Fortunately for the drainage of the plot, the subsoil consists of coarse sand and gravel, which was placed there when the excavation for the school building was made. Upon this foundation a heavy layer of properly fertilized loam was placed. Each succeeding year the garden has been plowed and fertilized. This has been the cause of one difficulty. The plowing excluded from our available plants all perennials. Each year the garden was planned anew without "an old year's brand to light the new." That deprived the gardeners of many experiences which are absolutely necessary in the growth of those who are to "love the green things growing."

According to the plan followed for the first three years, every grade planted a bed of some grain or vegetable for the common use of the school. A second bed was assigned to each grade, to be divided into individual plots. It is evident that under this plan the garden presented a motley appearance, since every child planted in his bed whatever he chose, irrespective of what was in his neighbor's bed. Sometimes several kinds of vegetables and flowers were planted in a bed two by three feet. Tall plants shaded and interfered with the growth of low ones; vines overran and crowded out other crops. The effect of the whole was not beautiful. The crop was limited in quantity and poor in quality. The care of the garden grew into a burden rather than a pleasant task. What is more important, the great opportunities which garden work offers toward unifying the school and enriching the social life were not realized.

After three years of such experience the children were ready to combine and organize their efforts, and last year, with the help of the teachers, a new plan was made, the teachers

keeping in mind that the garden should be beautiful; that each child should be allowed to choose what he would plant; that he should have a feeling of ownership about his garden bed and the crop he would harvest; that all plants should be placed in the environment best suited to them; and that every part of every bed should be easily accessible to the smallest child.

First, every member of the school wrote a paper indicating in order of preference his choice of vegetables and flowers to be planted in the garden. The accompanying lists include all plants mentioned:

VEGETABLES

Lettuce	Turnips	Beans	Cotton
Radishes	Carrots	Peas	Watermelon
Onions	Spinach	Watercress	Pumpkin
Potatoes	Parsley	Celery	Cucumbers
Tomatoes	Corn	Beets	Muskmelons
Cabbage	Popcorn	Peanuts	

FLOWERS

Pansies	Violets	Geraniums	Morning-glory
Sweet Peas	Mignonette	Sweet Williams	Nasturtiums
Cosmos	Bleeding Heart	Heliotrope	Lady Slipper
Asters	Forget-me-nots	Hollyhocks	Candytuft
Bachelor Buttons	Moss Roses	Daisies	Coreopsis
Sweet Alyssum	Roses	Lilies of the Valley	Easter Lilies

To this list were added names which the teachers suggested of plants which would be of service in the science, industrial, and art work of the school and which would add new acquaintances to the children's flower friends:

VEGETABLES

Wheat	Dill	Lavender	Plum Tomatoes
Sugar beets	Sage	Kale	Asparagus
Flax	Bohnenkraut	Pepper	Gourds
Kohlrabi			

FLOWERS

Nicotine	Stock	Marigolds	Celosias
Caladium	Wallflower	Amaranthus	Canterbury Bells
Four o'clocks	Salvia	Scarlet Runner	Cypress Vine
Ageratum	Ornamental Pepper	Sunflowers	Zinnias

Committees were formed, composed in each case of children who had chosen the same plants. The first two choices of every child were adopted. If, as in several cases, these committees were too small, the third, fourth, or sometimes fifth choice of a child was considered and sometimes volunteers were called for.

After these groups had been formed, a detailed outline of the work necessary to make the garden a success was as follows:

a) Making of the general plan.

b) Drawing of a plan for each teacher, indicating the parts of the garden for which her pupils were responsible.

c) Writing lists of names of children to act on various committees, these lists to be posted in the hallway.

d) Making individual seed envelopes.

e) Labeling same with name of seed, name of child and grade.

f) Apportioning seed.

g) Writing and attaching to each envelope clear and concise directions for sowing the seed.

h) Surveying the garden.

i) Digging-out of the paths (marking beds with string has not been satisfactory).

j) Making garden stakes and labeling same to correspond with envelopes.

k) Making large stakes with small signboards attached, to aid in readily finding the beds.

l) Placing of stakes in garden.

m) Making of a hotbed.

This list was presented to the school and the various kinds of work were either chosen by or assigned to the grades where they were best adapted. For instance, the plans were drawn by the seventh grade, envelopes made by the third grade, and directions for planting formulated by the fifth grade.

The making of the plan was the most responsible piece of work. It required consideration of many phases, most important among which were beauty, proper shapes of beds for convenience in planting, relative sizes of beds and their positions as to best conditions of light and moisture, and numbers of children acting on the various committees. For example, the favorite vegetable was lettuce. The amount of lettuce seed likely to be used was calculated, and this, with the size of the committee, was considered in determining the dimensions of the lettuce bed. In some cases an entire bed was assigned to one class, for the special study of some crop necessary to the work in that particular grade. For instance, the sixth grade took charge of sugar beets, the fourth grade of flax, the fifth grade of wheat, and the first grade of popcorn.

The work mentioned under *b* was important. From these plans every teacher knew what was to be planted in every nook, and by the colored spots knew at a glance where she might expect to see some of her pupils working. The names of the children did not appear on the plans, because the teacher in charge had a plan which included the names and directed the placing of the individual stakes. The beds were marked off by means of a board, the edge of which was pressed into the ground. The depression made was filled with sand, which stayed in place long enough to serve the purpose.

The flower garden was more difficult to plant, because the rows overlapped, and the general arrangement was more complicated. Here the beginning and end of every row was indicated by a stake, the two stakes being labeled alike and facing one another.

With this plan every child had all the information necessary to make him independent in locating his bed and doing his work. All stakes were marked with paint or ink to make them proof against the rain. A red chalk mark was the means by which the children indicated that a bed had peen planted.

Formulating directions for planting was an interesting piece of work. The motive of making all the directions so simple and clear that they might be read and understood by a child in the first grade made a demand for good concise English which the fifth-grade child could thoroly appreciate. Directions poorly stated might mean failure, disappointment, and a mar to beauty.

The interest shown in making the hotbed is worthy of mention. The science work on decomposition, generation of heat, plant food, and germination was done with zest. The hotbed was so generous in its productiveness that there was a good supply of plants to give to all children who wished to start home gardens. Many children made small gardens along the edges outside of the big garden. All summer good reports came of tomato and cabbage crops, fine specimens of flowers, etc.

After the planting was accomplished a careful record was kept in writing and painting of the date of planting and the date of germination and appearance of plants in the first stages of growth, and the changes from week to week. This record was made in order to enable us another year to distinguish the young plants from the young weeds. Many

mistakes in weeding were made this year. In some cases the children were temporarily discouraged because they expected the plants to appear too soon. One little girl who planted ageratum waited five weeks to see signs of growth. Just as school closed she found a few minute leaves. Four weeks later the plants were one foot high. This fall she supplied every classroom with blossoms for several weeks. Another year the data recorded will prevent this discouragement.

The school garden was a great benefit to the work in the art department, as it furnished abundant material and afforded the opportunity for continual use of flowers and vegetables in the study of elementary composition.

Some of the sources of special pleasure to the children were: the asparagus hedge planted to separate the vegetable garden from the flower garden, this hedge having been planted in May and started from three-year-old roots; the bright red and yellow celosias, some of which grew four feet tall and waved plume-like on either edge of the long center path of the vegetable garden; the muskmelons, which grew so thick and luscious that from a bed of twenty-four by nine feet were harvested over forty melons; the watermelons, pumpkins, gourds, and green peppers; the celery bed, which supplied the school for seven weeks; the caladiums, which grew from bulbs two inches in diameter to plants five feet tall, with leaves two and one-half feet long. Last, but not least, the garden gate, and the benches which the small boys made from an old tree trunk which they chopped down, should surely be mentioned, for they would appear in any child's list of the special attractions of the garden.

One grade took complete charge of the grounds in front of the building. There they planted all favorite flowers, making every effort to have a variety great enough to insure blossoming plants thruout the seasons. Some children made frequent visits to the garden during the summer. They weeded and watered at those times, but coming irregularly could not give the garden proper care. The watering and weeding during the vacation time was kindly done by the man left in charge of the building, and by other interested people. Some children expressed a commercial instinct by selling vegetables to their parents and to other children. They agreed to put the income into a common bank, the money to be used in buying some of the seeds for next year's garden. The treasury was also increased by funds coming from a neighboring grocer, who bought at regular market prices what produce was not given away.

In August Canterbury bells, Sweet William, and hollyhocks were planted. The young plants have a good start, and there are enough hollyhocks to plant along the entire front of the building.

This fall the flower garden was cleaned and spaded. A large number of bulbs were planted and by this means the children may enjoy the garden for many weeks before June, while other years they have had few blossoms before the close of school. At present many children are nursing geranium cuttings and old stocks planted in window boxes. The pepper plants are adorning several classrooms. All are waiting for the spring when we shall make a much larger hotbed and supply the home gardens and perhaps some children in other schools.

Aside from the definite knowledge gained and its all-around educative value, if the work in our school garden adds a few names to the list of those who will always love and make gardens, it would seem that it has been well worth the time and labor expended upon it.

Fifth Example—A Study of Transportation. Third Grade[1]

(Francis W. Parker School, Chicago)

The following reports were given by the children of the third grade at morning exercises. They are the outgrowth of a year's work in the study of the history of Chicago, and illustrate one phase of the development of transportation.

[1] From the *Elementary School Teacher*, January, 1905.

Last year the third grade studied about early Chicago, and the different ways of traveling in the early days. We decided to make a train of cars in the sloyd shop. We chose the cars because they are made just outside of the city, and because Chicago is such a very large railroad center, and because going by train is the most rapid way of traveling.

The reason we did not make a passenger train is because there is so much shipping and commerce going on in the city, and the passenger cars are too hard to make.

We also made plans for the truck, the wheels, and the track. We thought it would be nice to give the cars to the kindergarten children.

JOSEPHINE PALMER

Two people worked on a car. If each child made one car, there would be too many cars, and we would not get them finished. One worked at the sides and floor; the other one made the ends, the top, and the running-board. We put two coats of paint on them. One child put on one coat of paint, and the other put on the last coat. We grooved the sides and ends with a carving tool to make it look like boards running up and down. We used large staple tacks for the steps. We named each car and planned the lettering. We called the cars the "F.W.P. Fast Freight."

MILDRED ZENOS

We did not go to the carshops to measure the cars, as we had all seen freight cars, and we had a good book with pictures and measurements given.

Each child used the book and selected the car he liked the best. I chose the coal car. It was 34 feet long. We decided upon the scale to use in making the cars. We first thought we would make them 1 inch to 1 foot, but 34 inches would make them too long. Then we thought that $\frac{1}{2}$ inch to 1 foot would be better.

HELEN STAUFFER

We wanted to know the capacity for our cars. We used inside measurements. The box car is $18\frac{1}{2}$ inches long, 4 inches wide, and 3 inches high. I made a drawing of the floor of the car. We used 1-inch cubes to see how many cubic inches there were in one layer. We found 74 cubic inches. In three layers there were 222 cubic inches.

I made a drawing of the floor of the coal car too. In the first layer there were $58\frac{1}{8}$ cubic inches. In two layers there were $116\frac{1}{4}$ cubic inches.

FRIEDA MAYNARD

How we made our wheels: We wanted to have iron wheels for our cars, but we could not make them. We used Frank's wooden model for casting wheels in lead because we wanted to know how they cast large wheels. We took two flasks and pounded molder's sand into one of the flasks, and set the wooden wheels half way in. Then we sprinkled dry sand on so that the molder's sand in the other flask wouldn't stick. Then we put the other flask on it and the pegs held it in place. We then took the two flasks apart and took the wooden model out. We made air holes in the flask on top with a hatpin and a larger hole to pour the melted lead in. We put the flasks together again and poured the lead in the hole. When cool we took the flask apart and this is the way the lead wheels looked. The reason there are these holes in them is because there were not enough air holes in the flasks and the melted lead couldn't push the air out.

DOROTHY WING

When we made the wheels we used the same scale that we did in making the cars, only we made the flange bigger. The reason we did this is because the little cars are not heavy enough to stay on the track.

I made a model of the wheels on the lathe.

FRANK PACKARD

Everybody in the third grade last year made a drawing for the truck for our cars, and we at last decided upon one. The truck is made of some metal. It fits on the bottom of the car and holds the wheels onto the car. We are going to screw our truck to the car so it can turn a little when going around curves. We did not plan to keep the side of the truck from hitting the wheels, and if it did the car could not move very easily, so we think we will put a washer between the truck and the wheels. The wheels are ⅜ inch below the bottom of the car. We made them that way so the wheels will not hit the bottom of the car. We shall make the hole that we shall put the axle in larger than the axle, so it will have plenty of room to turn around.

LUCY SMITH

If we were to use these cars we would send the stock car west to the cattle ranches to be filled with cattle and bring it back to the Stock Yards to unload. The refrigerator cars we would send to the Stock Yards, fill with fresh meat, and ship to the East where the people need it most. The coal car we could send right down in Illinois and fill with coal to help carry on the great manufacturing in the city. The furniture car we could fill with furniture here and ship West, where the people need it most. The box car we could take to Minnesota to fill with grain, or it might be used for any common freight. The caboose is used for the people who work on the train and the men who look after the stock.

We went down to measure the kindergarten circle, and found it was sixteen feet in diameter. We found there was room just outside the circle for the track. It is to be made in sections so it can be stored away when not in use.

As we have done all we can on the cars, we have asked the big boys to help finish them, so the kindergarten children can use them very soon.

OWEN WHITE

There were many problems in arithmetic not suggested in the children's reports, such as finding the capacity in real cars, and finding the number of board feet and the cost of the lumber used in making cars.

B. STUDIES OF INDUSTRIES IN THE GRAMMAR GRADES

1. THE CERAMIC INDUSTRIES[1]

It is the purpose of pottery teaching not to develop a craft nor, primarily, skill, but to present for the first time in school life a complete view and knowledge of some one industry (ceramics), and to call attention to artistic excellence as something to be desired; in other words, to develop a high order of industrial sense, and this involves design. Objects to be modeled should in *every* case have a real use, and that use should be in mind to the last. They should be familiar objects and usually admit of a bit of decoration or decorative treatment. The following list will be suggestive:

Tiles (square, round, oblong, triangular) for flower pots and tea pots. Square tiles of various weights for paper weights. Incised, inlaid, and modeled decoration.

Shallow saucers and trays.

Bowls. These if well modeled are an addition to the tea or dining table. Incised or modeled decoration.

Ash-trays, match-holders.

Ink-wells, which may have space provided for pens.

Flower-pots. These furnish one of the best problems in fine proportions and reserved decorative treatment. Incised or modeled decoration.

Receptacles for flowers. The vase should be designed for characteristic kinds of flowers—those with long or short stems. Incised or modeled decoration, suitable color.

[1] From "A Course of Study in Manual Training," by C. L. Boone, *Manual Training Magazine*, December, 1908, February, 1909.

Fern-boxes. These are usually square but may be oblong like a miniature window-box. Each of the four sides offers a most tempting space for decoration.

Jars with covers, for crackers, candies, tea, tobacco, etc. These are fine technical problems representing the greatest development of fourth- or fifth-grade work. The design problem here is simple and definite.

The above exercises aggregate more than any class can do in one year but they represent work which has been tested in the fourth and fifth grades. . . . .

Processes

The teaching is begun in the following way: pupils are instructed in the handling of clay and in the manner of making good tiles that will not crack or warp. Tiles are built most easily on common school slates. The size of the tile having been determined, a thin layer of clay is built with small pieces well worked together, making a foundation somewhat larger than the required size. On this foundation other small bits of clay (as large as a marble or walnut) are thoroly worked until the tile is ¾ inch thick, homogeneous and perfectly smooth and level. The edges can then be cut straight and the corners square with a thin-bladed wooden or wire-end modeling tool. One tool with a wire loop at one end is sufficient for every pottery purpose in the intermediate grades. This tile is the foundation for all other pottery problems. It is the first thing made, serving as the bottom for jars, flower-pots, and boxes.

Bowls, trays, and other vessels are usually built by the method still used by the Indians. It is the practice which has been followed by most primitive people and can be made to produce very perfect ware. A lump of clay is rolled into a thick rope, ½ inch in diameter. This is coiled to form the bottom, and the coils well worked together on one side, the whole turned over and the opposite side treated in a similar manner. Additional rolls are laid around the edge of the foundation, on the tile, making the wall of the pot. When the wall has been built up three or four layers these should be worked together both inside and out to make the wall solid and firm. Each layer must be securely fastened to the one below, otherwise the vessel will crack in firing.

This practice of using rolls of clay produces pottery rather quickly and enables the pupil to soon learn to control the shape of the piece. To make the pot grow larger in diameter as it grows up, each successive layer is laid a bit toward the outer edge of the rim; to contract the top, the successive rings of clay are attached to the inner edge of the roll beneath. To be successful the rolls should be made with the fewest possible manipulations, as clay tends to dry and crumble with much handling. . . . .

This primitive process is quite as satisfactory for rectangular things, only care must be used to keep corners square and the sides straight.

Pottery, even built ware, should be as thin as possible. As pupils gain skill their building ought to be more true and they should make lighter pieces. All pieces made in this way must be scraped down smooth on the outside, and this process can be carried on until the walls of the pot are quite thin. The scraping (with the tool mentioned) should be done if possible after the work has stood a day or two and become somewhat stiffened, so that handling will not put it out of plumb. . . . .

Decoration

Ornament should keep its proper place as a part of the whole design. The application of ornament should be consistent with the material of the object decorated. Clay pieces may be embellished by motifs scratched in the soft material, or modeled in relief, or even painted on, if the painting be done in color that will stand fire. The most direct ornament is that incised in the clay itself and this kind is the backbone of design for pottery decoration.

(These articles include detailed directions for applying decoration, firing, glazing, etc., with lists of material required and their cost.)

2. A STUDY OF THE MACHINE SHOP IN GRADE VI[1]

(Horace Mann School, New York)

From the handicraft work of the preceding year the sixth grade advances to a study of the factory, or mill, as illustrating the modern method of production. In carrying forward this study, the class constructs a model of some type of factory and installs models of machines, which are belted to lines of shafting and driven with water-wheels. Along with the constructive work, and of fully equal importance, is the study of an actual factory, its system of organization and division of labor, the source of power, and the nature of its processes and products. Visits to shops and mills are an important help in this part of the work.

Just how the study is conducted may perhaps best be illustrated by describing the work of last year. After a discussion of the importance of the factory in modern industry, how its great development was made possible by the introduction of power and by the division of labor, the boys suggested various kinds of factories that they would like to build. The machine shop was most popular, and it was proposed to combine with it the wood-working mill, second in choice, in order to represent a complete equipment for manufacturing in wood and metal. The erection of a suitable building for this equipment was discussed by the class. The problems were presented as to what kind of construction was required to accommodate heavy machines, and how these machines should be arranged with reference to their operation and the use of power. The boys thought out the different problems quite intelligently, and gave a number of good suggestions as to how the factory should be built. They suggested that the most particular work needed the best light, that the heaviest machines should be near the walls, that machines of the same kind should be grouped together, and that they should be placed in rows in order to receive the power from the lines of shafting. The ideas brought out were reduced to a definite plan which was drawn on the board, and from it a lesson was given on the names and functions of the principal structural parts of the mill, and the methods of framing them.

The class was then organized into several construction squads for the purpose of erecting the factory building. Long strips of wood were provided, and each squad proceeded to make and assemble its assigned part. When the boys on the sill and plate group had completed their part, they located the places on the sill and plate for the studs, floorbeams, and stringers. As each portion was finished, it was put in, the roof trusses were placed, the floor laid, and the entire class of twenty to twenty-five boys was kept busy up to the time the building was completed.

The next part of the work taken up was the machine equipment. The boys were asked to describe some kind of machine that they had seen in operation. While most of the boys could describe a machine as to its outward appearance, few could tell how it worked, or what was its value as a producer. Their observations as a rule had not penetrated below the surface. Visits to shops were made with the definite aim of securing the important facts about the things seen in these shops. Previous to taking a class on a visit, questions were given to the boys to be written in their pocket notebooks with spaces between the questions for answers. The boys were asked to note the name of each machine and its purpose, to describe the cutting tool, the kind of power used, and how the work was held in the machine.

When the class went on a visit to a mill, and the use of the various machines was observed, each boy was kept busy filling out his answers and making sketches, and as a result he came away with certain definite ideas, and was too much occupied during the visit to get into trouble. It has been said that it is useless to take classes of young boys on visits to shops, because they have little knowledge of what they see, and do not appreciate the meaning of it all. We find, however, that if the boys have become interested in the work of such shops, and if they know definitely what they are to look for, there is no question

[1] From the *Teachers College Record*, Vol. VIII, No. 3, pp. 56–60.

that the results realized are worth while. Papers were written describing these visits as part of the homework, and at the next lesson a discussion on the meaning and value of the division of labor was held. The boys described how the work was passed from man to man, each doing a part, and only one part. Reasons for having a man do but one small part of the work—just one operation—were asked for, and the suggestion was soon forthcoming that repeated practice enables a man to do one thing better and quicker. This, it was seen, meant less cost in labor, power, and room, and made the workmanship more uniform. On the other hand, it was suggested that to do but one thing all day and to know nothing else, was a disadvantage to a man as it hindered his advancement and gave him little to think about.

Models of machines were made for the mill, each boy making one machine. The woodworking mill was equipped with models of wood-planers, circular saws, and lathes, and the machine shop with drill presses, lathes, and planers. As each boy completed his machine, he installed it in the place planned for it, and then helped to build and put in a line of shafting and pulleys, and to run and adjust his belt. Class discussions were held on the subjects of shafts, bearings, hangers, and belts, as these elements were met with in the progress of the work.

The subject of power was then studied. The boys named the various sources of power with which they were familiar, as the steam-engine, electric motor, gasolene engine, hot-air engine, water-wheel, and windmill. The value and general uses of each were discussed, and the boys decided that the water-wheel was the one type that they could make. Different kinds of water-wheels were considered, making use of the observations of the boys in the country and in traveling. Catalogs and pictures were also shown. The impulse or jet wheel was chosen as the one best suited to be run by the city water supply. A model was shown the class with a demonstration of its operation and the question of the best form of buckets was brought forward. Various shapes of copper buckets were made and tested to find out which was the most efficient. The double-cupped pattern was proven to be the best, and a set of dies was provided at the suggestion of the boys, so that the buckets could be stamped out in copper in modern fashion. Each boy built his own wheel, and made the buckets for it. When the wheels were finished they were tested, and four of the best were picked out and coupled to the driving-shafts of the mill. These four were sufficiently powerful to drive the entire plant.

The project as a whole combined co-operative group work with individual work. Each boy, when the project was finished, had a machine and a water-wheel to drive it. At the same time he had co-operated with the other boys in his class in building and equipping the model mill, he had met the problems this work presented, had played a part in solving them, and was rewarded by seeing his work form an essential element in the whole result. Owing to the group organization of the work, the boys showed little of the tendency to lean on the teacher that is often the case in individual work. With responsibility placed upon them they found it necessary to act on their own initiative and to do their own thinking.

The subject of the power-driven factory, complicated and difficult as it appears at first sight, is in reality admirably suited to the boy of the sixth grade. His awakened interest in things mechanical, things that "go," is here given play and utilized to accumulate ideas. Individual ingenuity and initiative are aroused to the utmost by the constructive problems that the work presents, and the fundamental ideas of the factory organization are grasped with surprising readiness thru this intimate constructive experience. The boys obtain a broader experience in handwork in making this project than they would in making a course of useful models in some one material. There are a greater number of simple tool processes, and a larger variety of materials to work with. The subject is intensely interesting to the boys, and the ideas and principles are of value in the writer's judgment, far beyond the possibilities of any course of so-called useful models.

3. A STUDY OF PRINTING[1]

Printing is essentially a democratic art. It does not lend itself readily to the selfish uses of the few. Knowledge formerly in the hands of the few became the property of the many with the advent of printing. Its development has been parallel with the development of humanity, whose servant it has ever been.

This quality is one which recommends it especially for use in the schools. The average school is organized on an individualistic basis. Pupils are there for selfish motives —to gain knowledge. Social service in the ordinary schoolroom is so seldom met with because no opportunity is afforded to practice it. At times the spirit of social service creeps into some of our school subjects in a spasmodic way and then shamefacedly retires, and the old selfish, individual spirit reappears.

We find this the case in our woodworking shop, when the occasional group-project is worked out for the school, and then the relapse to the individual model. On this side, then, of providing opportunity for social service, the value of printing as a form of manual activity is noteworthy. A boy may go to the workbench to do a piece of work. This is usually for selfish motives. Seldom more than one piece is made. On the other hand, it is hard to conceive of type set up for one impression; it is seldom done. Printing presupposes many copies to benefit many individuals.

Take an inventory of the things a boy could print and enjoy selfishly, all his own, and they would be few indeed. I confess I have tried and find the list very small. His personal card, letter head, book-plate, and a few others would probably cover the list. Now take a list of the things he could enjoy with others and see the vast possibilities: motto cards, calendars, invitations to school parties, tickets to school entertainments, school paper.

Again make a list of the things which are a daily necessity in the life of this community, i.e., the school, and where does the list end? Report cards, blanks, spelling-lists, arithmetic lessons, labels for shop, labels for library shelves, circular letters, etc., etc. Do you not think the boy is more a part of his community, more in sympathy with it thru having served it? He is an important, valuable part of it. This feeling of responsibility, of value thru service, is an important lesson in citizenship.

SUGGESTIVE OUTLINE FOR COURSE IN PRINTING

I. Talks on History of Printing.
   1. Early methods of transmitting knowledge.
   2. Discovery of movable type; Gutenberg; effect.
      a) Improvement in type-making; lead.
      b) Improvement in press; Franklin.
      c) Modern methods; cylinder press; linotype.

II. Practical shopwork.
   1. Names of material used in printing-office.
      Practice in holding stick and in setting type properly.
      Setting type from "pied" matter for practice in holding stick.
   2. The type-case; lay of the cases, cap and lower.
      Type-faces; prominent names.
      Point system; lining system described.
      Distribution of type set in previous lesson.

III. Excursion to a typical job office to see all the processes of printing in operation, especially noting workmen and their methods.

IV. Practical shopwork.
   1. Simple composition; spelling-lists.
      Margins: top, bottom, and sides.

[1] From "A School Print Shop," by L. W. Wahlstrom, *Manual Training Magazine*, December, 1908, pp. 134–48.

Justification of lines.
Removal of type from stick; tying up type.
Removal from galley to stone.
Correcting.

2. Plain reading-matter.
Rules for spacing; indenting paragraphs.
Space between words and at end of sentence.
Size and style of type in relation to nature and use of job.
Consideration of paper: size, quality.
Margins: bottom, sides, and top.
Size of type-mass in relation to shape of page.

English composition, reprints of lessons, school papers, etc., will furnish abundant material of this nature. A long job may be divided into paragraphs, each boy setting one or more paragraphs. This makes possible rapid work.

3. Tabular work with rules and leaders.
Mathematics necessary to figure out job.
Program blanks, report blanks, statements, charts, diagrams, etc.

4. Broken reading-matter.
Work calling for considerable judgment in regard to spacing, margins, and general planning; programs, invitations, posters, and similar work.

This should be attempted only after considerable practice in other forms above mentioned.

V. Talks on methods of illustrating.
a) Woodcuts.
b) Stereotype and chalk plate.
c) Zinc-etching.
d) Photo-engraving.
e) Half-tones.
f) Electrotyping.
g) Stereotyping from linotype composition.

VI. Excursion to an engraving plant where processes may be observed.

VII. Practical work.
1. Woodcut: each pupil to design and make a woodcut; tail piece; initial letter (possibly in two colors.)
2. Zinc-etching: same as for woodcut; book-plate for library; illustration for school paper; program cover. Combination of these designs with type composition.
3. Presswork: making ready of tympan; overlay and underlay; proper impression and inking; method of feeding.

VIII. Excursion to lithograph printing-plant.

IX. Excursion to newspaper plant.

4. A STUDY OF THE FOUNDRY[1]

To introduce the subject, a demonstration of molding and casting in soft metal was given with a borrowed flask and tools and some sand. The purpose of each tool was emphasized and, as each step progressed, the boys took notes and made sketches. Then each boy made a flask, rammer, slicker, and vent wire. As soon as the flasks and tools were finished, the classes were taken into the school foundry and given simple patterns to mold and cast in soft metal.

To furnish power for the operating of a model of a foundry, water-wheels were made and the best of these selected to run the blower.

[1] From "Industrial Studies in Manual Training," by E. E. MacNary, *Proceedings*, Eastern Manual Training Association, 1909.

As the boys finished their water-wheels they were organized into groups for constructing the different parts of the foundry, including the building, cupola, elevator for fuel and metal, blower, and the crane. Drawings were prepared for each part, with simple specifications, and put into the hands of the foreman of each group. These foremen were made responsible for the work of their own groups, and the teacher as superintendent dealt only with the foremen. These foremen were changed occasionally to give others some of the responsibility. Visits were arranged, and articles and illustrations were collected from magazines and trade journals. Each boy wrote a composition upon the process of molding and casting, explaining the parting, draft, venting, etc.

While the processes of construction were going on, each boy was treated as an employee of a construction company. It was surprising to see how sincerely the boys conformed to the industrial organization idea, and to note the individual growth as they measured up to their responsibilities when they were assigned to important positions.

C. SPECIAL INDUSTRIAL CLASSES

1. SPECIAL CLASSES—(In the Boston Public Schools)

It was for the purpose of making such experiments as are suggested at the end of the preceding report that the Boston School Committee on May 6, 1907, passed the following order, namely: "That the Superintendent be authorized to designate one or more boys' elementary schools in which the course of study may be experimentally modified for the purpose of determining in what way these schools may become more effective in training pupils for industrial pursuits, while at the same time maintaining their efficiency for preparation for high schools."

In accordance therewith, the Superintendent selected the Agassiz School, Jamaica Plain.

About a week before the close of school, copies of the following circular were distributed among the boys who were to be in Grade VI during the coming year.

AGASSIZ SCHOOL, JAMAICA PLAIN, MASS., JUNE, 1907.

An opportunity will be offered, next September, to fifty boys of Grade VI in the Agassiz district, to enter a class in which the course of study is planned especially for boys who have an aptitude for industrial pursuits.

This course will offer more manual training, shop arithmetic and working drawing, and at the same time maintain the efficiency of preparation for high schools.

If you wish your boy to join this class, please sign the following blank form, and return it to the master of the school.

As the number who can be accommodated in this course is limited, the earliest applications will be considered first.

The class was divided into two sections of twenty-five boys each, and each section worked one hour of each school day.

In determining the nature of the work to be done, and in selecting the articles to be made, one fundamental principle served as guide. Everything was made to conform as closely as possible to actual industrial work in real life. The product was not only useful but needed, and was put to actual use. It was something which could be produced in quantities. The method was practical, and both product and method were subjected to the same commercial tests, as far as possible, as applied in actual industry.

For two years these boys had done the regular manual-training work of Grades IV and V, cardboard construction, so it was decided to begin the industrial work with box-making.

It was found that pasteboard boxes, costing three-quarters of a cent each, were being used by the school department in sending out certain supplies, and the class undertook the manufacture of several hundred of these boxes.

The method employed was as follows: First a sample box was studied and careful note was taken of its use, of the material of which it was made, and of the details of its construc-

tion. Especial attention was called to the dimensions and to the need of obtaining accurate results in order that all boxes might serve the purposes for which they were intended and also be alike.

Each boy then made one entire box, drawing, cutting, scoring, gluing, staying corners, and pasting.

Next, by a brief talk, and with necessary demonstration an explanation was given of the greater economy of employing "industrial methods."

Jigs were made for facilitating some of the operations and for securing greater uniformity in the product. The class was organized into different groups of from two to six boys each, each group performing one of the several operations involved in the making of the box or the cover. There were the box-cutters, cover-cutters, stayers, pasters, fitters, and gluers. There were those who assembled, inspected, packed, and counted the boxes, and there were the assistant teachers—foremen in embryo.

Of course this was not all done in one lesson. By the time 750 of these boxes were made and packed ready for the supply team, the boys had gained at least a glimmer of light on five points of superiority of this, the industrial method, over the method first employed: First, that there was greater economy in the use of material. Second, that much time was saved, since it was not necessary to lay aside one tool and hunt for another at the completion of a single operation. Third, that the skill increased very rapidly by performing the same operation many times. Fourth, that a standard of accomplishment in a given time was established, below which no self-respecting boy wished to fall. Fifth, that a "good" box could not be produced if any of the group of boys did "bad" work.

The second project was a box smaller and more finely constructed than the first. Sixteen hundred of these were made.

In speaking of the methods used in making the later projects it is only necessary to note two points in which they differed from those first employed: First, in the earlier project the groups were chosen with reference to the ability of individual boys and the difficulty of the several operations. In the later, the groups were formed by taking the boys in order, just as they came, and a "foreman" was appointed for each group.

Second, a system of "check" was introduced which made it possible to trace poor work to its author—thus fixing responsibility. After the completion of the second project some calculations were made to ascertain the increase of efficiency, and it was found to be about 400 per cent.

Subsequent projects were vellum-covered pencil boxes, for use in high-school drawing-classes, and "Harvard" covers of vellum with leather backs and corners. Of the former about 475, and of the latter about 800 were made.

During the second year there were made, in addition to the above, and in considerable quantities, modeling boards, window-boxes, specimen boxes for the Normal School, spool-holders for the Practical Arts High School, looms, with heddles and shuttles, for the elementary schools, and cabinets for pencils, crayons, etc., for the Evening Industrial School.

The experiment is now in its third year, and 150 boys, three grades, are at work. The results have been so promising that the School Committee has inaugurated several similar experiments this year (October, 1909). The nature of these experiments is as follows:

a) Classes in Grade VI, giving five hours a week to manual training and drawing, without losing rank in the regular graded system. These classes will be called general industrial or work classes, and the product which they turn out will be such as can be utilized by the school supply department. It is expected that the work done will arouse their interest in things industrial, and that they will more naturally enter into more advanced industrial classes.

b) Classes made up of boys and girls fourteen years of age or over, selected from lower grades, and given drawing and constructive work for periods varying from ten to twenty hours a week, and also arithmetic, language, and other academic work. It is expected that some of these pupils on completing the first year will leave school, as they would other-

wise have done, but that a considerable number will remain for one or even two or thr additional years in higher industrial classes. The subjects included are, woodworkin cabinet-making, metal-work (heavy), sheet-metal work, bookbinding, and printing.

c) Classes open to graduates of the elementary school, similar in nature to tho described in *b*.

d) Special classes in high schools where pupils will have the benefit of the regul high-school work and an opportunity to study intensively one industrial subject such jewelry and silversmithing or electrical manufacturing, in the afternoons.

In most of the above classes it is expected that the product will be such as can manufactured in some quantity, and such as will be of actual use to the city. It is fe that there is great value in this productive labor on the part of the children. An expe ment of two years has proved that it is as vitally interesting to the pupils as any form manual training which we have ever employed.

2. SPECIAL CLASSES—(In the Bnai Brith Manual Training School, Philadelphia)

The general plan was for three distinct but related lines of work. The first of the was necessarily the supplying of manual training to the public-school pupils, since th was not provided by the Board of Education, except for girls. Arrangements were accor ingly made with the nearest public school which permitted the boys of the four upper grad to attend once a week during school hours. exactly as they go in other cities to a regul manual-training center.

The other two lines of work were arranged in the late afternoon and evening. Th afternoon classes were to provide more intensive work outside of school hours for publi school pupils, while the evening work was to aim at elementary preparation for certai trades.

It was thought that these three departments would in time become closely integrate and that they would open up the field of industry to the boys of the section in a very effe tive and natural fashion. The public-school classes would reach every boy and the tim allowance, tho brief, would necessarily give him some clearer idea of his fitness for mecha ical work. The late afternoon classes would attract the most mechanical and would gi opportunity for sufficient variety of work to enable them to ascertain more definitely wh special lines were best suited to them. This work, it was thought, would in many cas establish the interest and habit sufficiently, so that, on leaving the public school at fourte years of age, they would take up an evening trade course. This would not only tend keep alive their interest in mechanical work during this critical two-year period, but woul give enough of practical preparation to assist them materially in finding apprentice positions, and possibly shorten somewhat their apprenticeship term.

The four late afternoon classes (twice a week, 4:00–5:30) are no doubt the mo distinctive feature of the school's work. It was the purpose that they should be classes i fact, following definite courses of study, and not merely a group doing haphazard ext work. No one cared to predict the proportion of the public-school classes that woul register, nor the proportion of those registering that would continue. But almost from th first, 30 per cent. of the pupils in the three upper grades have been upon the roll, and th monthly attendance is from 90 to 97 per cent. Thus, for about a third of the boys seriou instruction in manual work proves to be a preferred form of play. Two classes specializ in the making of furniture, the other two in mechanical problems. Efficient turning-lath have been built, with babbited bearings and pulleys cast from lead alloy; also water-whee with power sufficient to run the lathe, sewing-machine, or small dynamo, the latest trad catalogs being consulted by the class in the effort to secure the highest efficiency. Whe completed they were tested under a pony brake, each boy calculating his horse-pow according to the formula. A small screw-cutting lathe has recently been secured and th most advanced class is now building electric motors from the rough castings—learning i an excellent way the elements both of machine construction and of electricity. The turning

up of a dozen armatures on one lathe required extensive organization and some overtime work on the part of the pupils acting as lathe assistants, but the difficulties were not serious enough to disturb the interest of the classes in the problem.

II. REPORT OF SUBCOMMITTEE ON INTERMEDIATE INDUSTRIAL SCHOOLS

Aim of chapter.—This chapter aims to discuss a limited field of vocational education. On the one hand, it is confined to the industrial arts (the manufacturing and mechanic-arts pursuits as given in the U. S. Census); on the other to that form of vocational education which may be given in schools to youths (boys and girls) of from approximately fourteen to seventeen years of age, the majority of whom may be expected to constitute the rank and file of the industrial army.

The data or experience available as a basis for conclusions are extremely limited. In practice vocational education of an organized sort for the industrial callings has set sixteen as the minimum age—the usual age of apprenticeship. Again, existing types of vocational education have been either for particular trades, and so of a very specialized character, or so broad as to constitute merely the partial foundations for a subsequent technical training. Hence the report must confine itself to an analysis of the subject, and a study of the few existing schools which shed light on the problem.[1] But in view of the fact that so many communities and educators are willing to undertake experimental measures at the present time, it is felt that such a report as this may be helpful, especially in the fact that it converges its efforts on a fairly special problem in the entire field of vocational or industrial education. The following questions will indicate the lines of approach to the topic as elaborated in the following pages:

I. What is the meaning of intermediate industrial education? (Problems of definition and terminology.)

II. What are the elements in the social demand for this form of education?

III. What are the industrial fields in which this form of education is possible?

IV. What are the available groups of children for whom this education is desirable?

V. What are the practicable aims of intermediate education in industrial arts?

VI. What are the possible types and courses of work to be offered?

VII. How will the proposed form of education relate itself to:

a) Traditional forms of liberal (social and cultural) education?

b) The manual training of the elementary school?

c) The higher technical or industrial-arts education?

d) Trades and trade education?

VIII. What are the possible schemes of organization and administration, as regards support, control, etc.?

IX. What may be expected to be the cost and return of such work?

X. What are the possibilities as to co-operation of school and shop?

XI. What are the most significant features in experiments already begun?

[1] The report assumes familiarity with such recent material as the reports of the Massachusetts and New Jersey commissions; the Industrial Education number of the *Annals of the American Academy*, *Bulletins* of the National Society for the Promotion of Industrial Education, etc.

I. THE MEANING OF INDUSTRIAL EDUCATION

A. Principal divisions of education.—Vocational education, as the term is employed in this report, is one of the four great divisions into which all education which is not distinctly elementary (and therefore largely undifferentiated), may be divided. These four divisions are: (1) Physical education; (2) vocational education; (3) social or civic education; and (4) cultural education.

The above classification needs explanation. It is not generally employed, but the committee finds no agreement as to educational terminology, and much confusion results if terms are not defined. Therefore the committee adopts what appears to it the best classification at hand, clearly recognizing, however, that the above is neither complete nor are its divisions exclusive.

a) By physical education is meant all that educational effort carried on in a deliberate fashion (in school, home, shop, etc.) which is designed to improve and prolong bodily welfare. Physical training, instruction in hygiene, maintenance of hygienic surroundings, etc., are parts of this division as we find it in the schools. Physical education makes contributions to vocational efficiency, but is not designed deliberately for it.

b) By vocational education is meant all that training and instruction which purposely ministers to self-support and productive capacity. Historically, it must be recognized that vocational education has been given by what may generically be called the "shop," including in this term the office and the store, under conditions of apprenticeship. The home has for many, especially girls, been the "shop" in this respect.

c) By social education is meant that training, instruction, and stimulation of ideals which are aimed to improve one's ability to live the "group" or "membership" life. It embraces what we usually mean by such phrases as "moral training," "ethical instruction," "civic training," "religious education," etc.

d) By cultural education is meant that which aims primarily at the cultivation of the interests and appreciations which are intellectual and æsthetic in character, but which have more relation to avocation than to vocation. Literature, art (when considered apart from productive necessities), science, history, general knowledge, etc.—these are elements of culture which may be aimed at apart from vocation, and they may be made the basis of a rich life during hours of non-employment in the vocational pursuit.

It is recognized that the pursuit of any one of the above large educational aims reacts on the others; but it is contended that an effective education demands some knowledge of aim or purpose which can best be subserved in the later stages of schooling, by keeping the above aims separate in planning work and adapting methods.

In common practice two of the divisions given above (cultural education and social education) are described by the one word "liberal." Where "liberal education" is hereafter spoken of, it will embrace these two divisions.

B. Definition of vocational education.—While we define vocational

education as that whose means and methods are determined mainly by the requirements of particular callings or groups of related callings, it is evident that the directness with which any given educational procedure bears on vocation may vary indefinitely. The study of science, mathematics, or art may or may not be vocational according to its purposes, emphasis, and the types of students concerned. Some studies may be vocational, not in the sense of conferring any immediate vocational power, but in giving certain broad foundations for development. Thus, manual procedures, such as shop and laboratory practice may be vocational, tho having no specific end in view. No absolute line of demarcation can be drawn here, but for convenience we shall recognize the following divisions of procedure in vocational education:

1. Around any vocation, or large or small group of related vocations, may be assembled a certain amount of history, geography, economics, etc., which can be studied for the sake of "industrial intelligence," breadth of view, vocational ideals, etc. Outside the field of industrial arts such studies are now found, e. g., around the study of medicine, law, engineering, commerce, and even agriculture. There is no reason why such studies should not develop appropriate to various grades and classes of workers in industrial arts. If designed primarily to reinforce vocational power, growth, and satisfaction, they should be called vocational studies. In this report they will be designated as the "general vocational studies."

2. Back of almost all groups of related vocations are certain phases of mathematics, science, drawing and art and manual practice in which training, instruction, and laboratory practice may be given primarily with a view to their ultimate application to a vocation. These will be called the technical aspects of vocational training.

3. The third group of studies or practices involved in vocational training will be called the concrete. Under this head in industrial arts is comprised manipulative practice with the materials and tools such as are found in the industrial-arts processes themselves. Shop work, field work, the construction of usable and salable products, are all more or less involved. In this division the manipulative practice becomes the chief means of learning, whereas in the technical division it is the secondary means.

It is not assumed that vocational efficiency comes only thru specialized training to that end; physical education, training in civics and morals, and many of the aspects of cultural education make contributions to vocational success; but in practice these results are secondary effects of the pursuit of other aims.

Under vocational education we have five great divisions: (*a*) Professional; (*b*) agricultural; (*c*) commercial or business; (*d*) industrial; (*e*) household arts. The United States Census divides vocations into five main classes, which correspond largely with the above. The following are the divisions, with the number of workers (women workers indicated by the second number in each case) in each: (*a*) Professional, 800,000 and 400,000; (*b*) Agricultural,

9,400,000 and 900,000; (*c*) Trade and transportation, 4,200,000 and 500,000; (*d*) Manufacturing and mechanical pursuits, 5,700,000 and 1,300,000; (*e*) Domestic and personal service 3,400,000 and 2,000 000.

In each of the above divisions we may recognize stages of educational preparation, as elementary, intermediate, secondary, and higher. In the professional group an intermediate or secondary stage of vocational preparation is usually undifferentiated; all professional education belongs to the "higher" stage. Technical schools, high schools of commerce, agricultural schools, schools of household arts, all give us well-defined "secondary stages," taking selected individuals who have completed the elementary course and who have ability and economic position sufficient to justify the hope that they may become leaders in their respective fields. Elementary vocational training is something hardly recognizable as yet. The term "intermediate vocational education" may be applied to that which does not assume either the ability or the length of course presupposed in "secondary education," but assumes an age beyond that commonly found in the elementary school.

C. Definition of intermediate industrial arts education.—This form of vocational education is primarily (*a*) for youths from fourteen to sixteen or seventeen years of age, in (*b*) the fields of the trades and manufacturing industries, and (*c*) does not assume in its students completion of the elementary course of study. It is primarily designed for those who will probably be the rank and file of industrial workers. It is not assumed to give complete trade training, or complete equipment for specialized factory processes, but rather to lay a practical foundation for these.

Schools already existing indicate, however, that an intermediate school might, according to circumstances, (*a*) prepare for an effective apprenticeship (like the vocational school in Rochester), or (*b*) for actual trades work where this is relatively simple (like the Manhattan Trade School for Girls), or (*c*) for study in more advanced trades schools, where these take the place of apprenticeship. The possibilities of preparation for highly specialized factory processes are yet obscure.

II. THE SOCIAL DEMAND FOR INTERMEDIATE INDUSTRIAL EDUCATION

This subject has been much discussed in recent literature, and the report is in substantial accord with the more complete expressions which have been made by various commissions, special students, etc., in recent years. For convenience, however, the commonly accepted positions are summarized here:

A. General considerations.—(1) Vocational education, given by some agency, is indispensable both to the success and happiness of the civilized individual and to the prosperity and development of the civilized state.

2. The agencies formerly responsible for producing vocational efficiency were the home and the shop (apprenticeship in all callings—industrial, commercial, agricultural, and household). But, for a variety of demonstrable reasons, connected largely with modern economic development, each and all of these have declined in efficiency as educational institutions.

3. In the field of cultural and civic (liberal) education the state has assumed a constantly increasing rôle in all countries. State support, state control, and state compulsion of the individual toward attending school and reaching a certain standard, tend constantly to increase. Better-trained teachers, better equipment, free books, specialized schools—all these indicate the increased socialization of liberal education. On the other hand, barring certain professions and engineering callings, the part played by the state in vocational education has actually become less. No longer do laws of apprenticeship protect the child against either himself or his economic environment. The home has become relatively helpless. In other words, the social principle of *laissez faire* has assumed ascendency in the field of vocational education with disastrous consequences so far as large numbers of individuals are concerned, and with harm to the state.

B. Special considerations.—(1) Especially under modern conditions does apprenticeship fail to provide for the intermediate stage of industrial arts for children from fourteen to seventeen. During this time multitudes of children enter the so-called juvenile employments which are peculiarly adapted to profit by their labor, and which are fairly remunerative, but are devoid of opportunities for genuine industrial training. In fact they are more than educationally sterile—many of them directly disqualify the child for further vocational advance, owing to their effect on health, morals, and other forms of efficiency.

2. So far has this last condition been recognized that in the more progressive states legislation defining the conditions of undesirable industries or fixing more satisfactory educational standards is rapidly having the effect of closing many industries to youths under sixteen. This increases the need that the period of at least two years after the elementary school shall be utilized for vocational training.

3. The industrial world is persistent in its demand for more efficient workers. In some cases the efficiency demanded is that of mere technique or skill; in others for qualities of intelligence or moral character. We have no satisfactory evidence that both sets of qualities may not be produced by appropriate educational procedures centering along vocational lines. It is well known that in some industries this education is now given, supported by philanthropy. It is reasonable to expect that systems of vocational education can be devised which will enhance the productive capacity of a very considerable number of individuals, that will relieve the population in time of the large proportion of untrained laborers who now so largely fill the ranks of casual labor, and easily become the unemployed.

4. The evening continuation school which was formerly thought to be a possible solution of the problem of industrial education, has largely failed to realize expectations, and under present industrial conditions, probably ought not to be expected to, so far as the group of young people here under discussion is concerned. Youths of from fourteen to sixteen are still too young to

carry on night study after a full day's labor, especially if the principle of the shorter working day has not been accepted. Sleep and rest must not be withheld, and it has been proven that evening instruction for such youths is largely futile owing to the tired condition of the body.

5. It is not assumed that in the years from fourteen to sixteen it is practicable to give a complete vocational education; in most cases the completion of the education must be found in the actual pursuit of the calling. What is accepted is that under school conditions, where the needs of related groups of vocations are kept clearly in mind, it is practicable to give a very considerable part of the training which makes for vocational efficiency, and especially those parts which the industry itself proves least able to give. What shall be given, and what proportions relatively of the general, the technical, and the concrete, must be determined by the economic conditions and capacities of the children concerned, the characteristics of the industry, etc. In some cases, the conditions may permit the fairly complete realization of vocational efficiency in a comparatively short time; the Manhattan Trade School for Girls in New York provides such an example. In other cases it may prove most feasible to utilize this period largely for general and technical training, with the reservation that this shall be adapted to the major groups of children concerned rather than to a few select individuals who may reach the higher levels of education or vocation. In still other cases it may prove necessary to have one kind of concrete work in the school, and another kind in the actual industry. These represent problems to be worked out in the process of adapting vocational education to localities, or rather to groups of young people in connection with the industries possible for them.

III. INDUSTRIAL FIELDS FOR SPECIALIZED EDUCATION IN INDUSTRIAL ARTS

Specialization characterizes modern industry. A fundamental objection to trades training in public schools is found in the great diversity of trades, each of which would require a separate school. Hundreds of distinct trades are recognized by the United States Census, scores of which may be found in a single population center. What was once the simple vocation of shoemaking has evolved into several dozen trades, in some of which skilled, in others unskilled, labor is in demand. The intermediate industrial school cannot primarily aim at trades teaching because (*a*) these are too many and diversified, and because (*b*) training for them would be narrow and intensive, and would prevent the realization of the larger vocational qualities which such education aims to attain. But it appears that back of many groups of trades or factory processes are found certain elements of likeness in the materials employed, the tools used, and the general character of the product.

Shoemaking, for example, involves on the part of nearly all the specialized workers experience with leather, and with leather-working tools. Something of chemistry, of physics, of trades, of history, can be profitably utilized by all varieties of shoeworkers.

As another example, in the United States something like a million workers are in trades or factory processes based on wood and woodworking tools. While there are dozens of specialized trades, there is a fundamental body of experience and knowledge which may be acquired thru concrete and even productive work on a relatively simple scale.

Similarly we find in the steel- and iron-working vocations something like a million workers. It is evident that machine-shop practice, forge work, foundry practice, etc., are more or less truly vocational for these callings; and these subjects are already taught under school conditions. Given more time to ordinary boys for concrete practice, and the related theoretical work, it is evident that vocational training for this group of industries becomes quite feasible.

The following represents a classification of the chief industrial groups represented in the United States toward which it would seem that the intermediate industrial school might operate to best advantage. The number of workers in each is roundly stated (where two numbers appear, the second is for women workers).

A. Industries based on wood and woodworking tools: Carpenters, 600,000; cabinet makers, coopers, saw-mill workers, etc., 346,000.

The bench work of the upper grades of the elementary school offers suggestions as to concrete work. Drawing, physics, study of woods, the crafts studies, some phases of economic history, principles of forestry, etc., for supplementary studies. Some forms of woodworking are localized, like furniture-making (which the new school in Rochester recognizes); but each large city requires a constant supply of carpenters. Trade schools for carpentry already exist (Baron de Hirsch, New York; Williamson School, Philadelphia, etc.). An important part of such a course would be the analysis and operation of such woodworking machinery which involves main principles of machine action. This field of intermediate work offers peculiar facilities for producing usable and even salable products; in certain industrial centers the part-time system might be developed, especially in connection with furniture-making.

B. Industries involving primarily work with iron and steel: Blacksmiths, 226,000; iron and steel workers (in mills), 290,000; machinists, 283,000; plumbers and gasfitters, 97,000; others 100,000.

Here trade-school work and the shopwork of technical high schools offer suggestions. Much of this work leads to well-defined trades. The intermediate school might confine itself to preparing for successful apprenticeship. Drawing, certain phases of applied chemistry, applied physics, analysis of machine tools, study of the contemporary aspects of the production and consumption of iron and steel—all these offer rich opportunities for development of supplemental courses. Perhaps this field does not offer abundant opportunities for productive, i. e., usable or salable work; but its possibilities have not been fully tried.

C. Bookbinding and pasting trades. Bookbinders, 14,000 and 15,000 (women); box-makers, 3,000 and 17,000; and, possibly, some of paper-makers, of whom there are 26,000 and 9,000.

This is a limited and usually localized group of industries. Preparatory vocational work would necessitate specialized practice, and specialized technical work. A good field

for making of complete products. Some experience in this field has been had under manual-training conditions. The work is well adapted to girls.

D. Printers' trades, 139,000 and 16,000.

These offer peculiar opportunities for preparatory vocational training. Successful examples found in reform schools, and in the volunteer work of some public schools. Technical studies and general vocational studies could easily be evolved, as the field is rich in material. Largely localized.

E. Industries involving leather and leather-working tools: Boot and shoe makers, 169,000 and 39,000; harness and saddlery, 40,000; tanners, 42,000; trunks, etc., 5,000 and 15,000.

A great variety of trades rest on these materials, many of which are localized. Unskilled labor is said to play a considerable part, but one aim of industrial or vocational education here discussed is to give the laborer in fields not requiring skill some appreciation of social significance of his work, and capacity for change from one minute division to another. Obviously opportunities for concrete expression here are abundant; and usable and salable products might, within certain limits, be produced. Technical work would involve special aspects of chemistry, physics, experimentation with materials, and, possibly, drawing. Mathematics might or might not figure. Analysis of machines, certainly a large part. Schools of this kind exist in England, but on advanced or technical scale. General vocational work could easily be devised.

F. Textile work on factory scale: Cotton mills, 125,000 and 120,000; hosiery mills, 12,000 and 34,000; silk mills, 22,000 and 32,000; woolen mills, 42,000 and 30,000; other textile mills, 53,000 and 51,000.

A great variety of trades, in which it may prove difficult to find basal courses, since the statistics include under these mill-workers, dyers, spinners, etc., who work with quite different materials. The problem here is complicated by doubt as to whether the mill itself is not, in many cases, the only school that can give operative skill. The Public Industrial School at Columbus, Ga., is giving work in this field, but for foremen rather than rank and file. It is evident that, if it should prove worth while, it is not impossible to provide the concrete work here, beginning even with hand processes, as in woodwork. Technical work could involve analysis of machinery, study of textiles, possibly some physics, drawing, mathematics, and chemistry doubtful, except for specialized workers. General vocational studies—of markets, sources of supply of raw materials, economics of consumption, etc., easy to develop.

G. Clothing Trades: Dressmakers, 2,000 and 344,000; millinery, 1,000 and 86,000; seamstresses, 4,000 and 146,000; tailors and tailoresses, 160,000 and 63,000; shirts, collars, etc., 8,000 and 30,000.

In this field we have much experience to draw upon, notably that of the Manhattan Trade School for Girls and the Boston Trade School for Girls. Opportunities for concrete work of a satisfactory type (usable, even salable) abundant. Related technical work in art, drawing, analysis of tools and machines, and possibly in the properties of the peculiar materials employed fairly numerous. Some mathematics of a practical nature can be developed. A rich field for general vocational studies, like economics of consumption, history of textiles and their uses, geography of markets and sources of supply, social conditions of workers, etc.

H. Engineers and firemen: It would appear that there must be over 400,000 workers in this field.

The evening schools and the new school at New Bedford seem to offer suggestions as to practical courses for the type of boy here under consideration. Concrete work could be found in machine work and engine running, technical work in mechanics, heat, engine, machine construction, drawing, etc. Many sources of general vocational work.

The following groups are important in numbers of wage-earners and value of product but represent less evident possibilities of approach for the intermediate industrial school.

I. Industries involving primarily work with stone: Masons, 160,000; roofers and slaters, 9,000; marble and stone cutters, 54,000; plasterers, 35,000.

In the formation of intermediate school work in this group of industries, we have little experience to fall back upon. Apprenticeship still survives here in considerable measure. Some of the concrete work would be similar to that found in iron and steel; theoretically it would appear easy to provide other forms of concrete work with building-stones, marble, etc. The technical studies would involve modified forms of drawing, art, mechanics, and mathematics; and general vocational studies based on specialized phases of geography, geology, history, economics, would be easily supplied if the school of this type were called into existence. Many of these industries being localized, the establishment of such schools would be a simple proposition.

J. The clay and glass industries, where furnace heat is also a factor; Brick and tile makers, 50,000; glass-workers, 50,000; potters, 16,000.

These industries are usually much localized. Some of them now employ child labor extensively, suggesting the possibilities of some "half-time" connections. They require, in so far as they utilize skilled labor, specialized forms of art instruction, and, as further technical studies, could develop a specialized chemistry and physics. Schools in these callings are yet rare, except on remote artistic levels.

K. Industries concerned with paint, paper, plaster, etc.: Painters, glaziers, varnishers, 277,000; paperhangers, 21,000.

A variety of trades having apparently a large common basis. Concrete work should be easy to provide, as suggested by trades schools now in existence. Drawing, mathematics, science, etc., of a specialized kind. Largely localized so that each large city could afford to maintain such a school, if it appears that apprenticeship is ineffective.

L. Food making or preparing industries, but not household arts: Butchers, 113,000; bakers, 74,000 and 4,000; confectioners, 21,000 and 9,000; miscellaneous food-preparers on factory scale, 65,000 and 5,000.

A field in which little is done in America in preparatory industrial training, but numerous examples in Germany. It would appear that opportunities for concrete work should be abundant and field of technical work in biology, chemistry, physics, quite unlimited. Possibly one of the few industrial fields not requiring art or drawing as a vocational study. Abundant general studies from the economics of consumption. Much of the theoretic material could be derived from best schools in household arts. Since confectionery making, for example, is now a juvenile industry, half-time co-operation might be feasible.

M. Workers with tobacco: 87,000 and 43; this is largely an unexplored, but socially important, field of production.

N. Miners and quarrymen: 500,000.

This is an immense and important field of industry. It may offer good opportunities for preliminary training but it has so far received little consideration. Possibly half-time work might suffice to give part of the concrete work. A certain amount of concrete work with wood and steel would be of some service. Opportunities for technical work in science and mathematics abundant, and also probably in analysis of machines, studies of gas, explosives, etc.

Other divisions might be made. For example, metal-working on a small scale, or with materials other than iron and steel, furnishes certain fairly localized trades, for which special preparation might be necessary. Schools for jewelers and watchmakers may furnish some hints, as also evening classes for tin and sheet metal work. This work is being taken increasingly by girls. Let it be repeated that the above classification is merely tentative, with a view to finding a few simple groups of callings, for each of which suitable basal preparation could be given.

IV. GROUPS OF CHILDREN AVAILABLE FOR INTERMEDIATE INDUSTRIAL SCHOOLS

Schools or courses cannot be established to meet individual wants. Economy requires that there should be available for any type of vocational school large groups whose interests, capacities, and probable economic destination justify the maintenance of such schools. The following commonly accepted facts are important:

1. Large numbers of children, commonly more than half of those entering public schools, do not complete the eighth grade, and these usually leave school as soon as the compulsory period of school attendance has elapsed.

2. Of pupils finishing the elementary a majority either do not enter the high school, or their period of attendance thereat is brief.

3. In urban communities large numbers of the above children enter the non-educative juvenile employments.

4. In the majority of cities of the United States, excepting those that are purely commercial centers, there is a considerable localization of industry. Examination of the census of manufactures will reveal that this is the tendency to an extent not commonly realized.

5. In all large cities there are found enough workers in certain trades to justify preparatory schools looking toward these industries: woodworking, working with iron and steel, printing, painting, varnishing, etc., food stuffs (baking, butchery), and possibly stone and tile work. For each of these groups enough workers in prospect should be available to justify the maintenance of such schools.

No satisfactory studies exist showing the distribution of the grades or kinds of ability suitable for the various major types of vocational training proposed above. Probably such studies may not be expected until society has begun establishing schools, and finds a considerable group of children not adapted to one, but probably suitable for another.

Experience shows that it is not difficult to fill up a vocational school, once

its purpose and industrial value are recognized. Ultimately we may reasonably expect attendance to be made compulsory on some form of vocational school, the pupil being left to elect the type of vocation toward which he will aim.

V. THE PRACTICABLE AIMS OF INTERMEDIATE INDUSTRIAL EDUCATION

In view of the average age attainments, and economic necessities of the children here under consideration, it is evident that intermediate industrial education must carefully define its aims. We note in the first place that it is not practicable for it to aim (*a*) to train educational leaders, or (*b*) to lay the foundations for any and all forms of vocational power by a single course of training; and it is not desirable that it should aim (*c*) to make vocational training incidental or subordinate to further liberal training, or (*d*) to confine itself to a narrow and highly specialized trade training.

a) The training of educational leaders in the field of industrial arts has already received much attention. Schools of engineering and mechanic arts, some of which receive national aid, already exist; the cities now support a variety of forms of technical training. While youths of promise will always pass from schools like that under contemplation to the higher schools, it would defeat the true purpose of the former if it allowed its program to be materially modified in the interests of those who are probably able to take the more prolonged and higher forms of training.

b) It is a favorite dream of educational theorists that some form of all-around training will give equipment for all vocations alike. This is a survival of the theory of formal discipline and of the belief that the logical order within studies is also the pedagogical order. From this point of view, drawing in its mechanical aspects, and mathematics, are fundamental vocational studies. But an analysis of industries will show that in many drawing is hardly used at all; and that in all, the drawing, mathematics, and science that are used are varied greatly according to the industry. Hence it is essential that each group of related industries should develop its own preliminary course of training, as illustrated in the discussion of the groups of industries previously given.

c) There survive in educational administration certain forces which constantly tend to deflect education, which has been intended to be vocational, toward general or liberal ends. Those who support this tendency take far more account of the few pupils who succeed in any type of school than of the much larger number who usually drop by the wayside.

d) It is possible to give a type of vocational training to youths which shall be so narrow and specifically technical as to entail the same effects as too early industrial work. This undue specialization is far more apt to take place under private than under public-school auspices.

Among the aims which such a school may well follow are these: (*a*) the development of a part of the experience, intelligence, and skill requisite in a given group of related industries; (*b*) the adaptation of its work to the prevailing industries of the locality; (*c*) A certain amount of vocational selection;

(*l*) The development of certain moral qualities and ideals, such as business honesty, fidelity to ideals of workmanship, a sense of industrial responsibility; (*e*) The production of certain large industrial qualities such as adaptability, capacity to advance, interest in work, etc.

a) How much the school of intermediate grade, having comparatively young pupils for two or three years, can accomplish along vocational lines is not yet known. Much will depend upon the type of industry involved. The Manhattan Trade School for Girls in New York, within a year is able to accomplish much toward vocational fitness in certain clothing trades, and yet gives considerable attention to the physical, moral, and even cultural development of its pupils. For other industries, whose apprenticeship can only begin at sixteen or later, the intermediate school can only give a variety of preliminary experience. It is believed by many students that the kind of experience which a farmer's boy obtains along vocational lines is a valuable foundation for subsequent development. He works with many tools, with many kinds of materials, and usually with some appreciation of the outcome of his work in terms of the socially valuable. Courses in industrial arts can be devised, which, at least, will give similar experience with the tools, materials, products, information, etc., involved in groups of related industries.

b) Both on the side of its pedagogy and in connection with its social usefulness and command of local support, industrial education should grow out of community needs. For this reason, schools can be established, as a rule, only where some prevailing industry makes a considerable demand for trained workers. An examination of the census of manufacturing will show that to a large extent industries are localized in the United States, excepting only some of the "crafts" such as carpentering, blacksmithing, baking, etc. This localization of industry gives a point of attack for those proposing the new type of school.

c) Within limits a preliminary vocational school should serve as an agency of selection, primarily by indicating to youths the occupations for which they are manifestly unfitted. Under modern conditions of employment, without such experience, intelligent vocational selection is almost impossible. Schools which give youths opportunities to work with a variety of tools and materials, under competent direction, would enable parents to recognize the lines along which their children are most likely to succeed, and negatively those in which success is most unlikely.

d) The moral qualities most needed in industrial workers are easily recognized, but the psychology of their production is yet very obscure. But it seems reasonable to believe that the surest way to obtain such qualities is in connection with the performance of actual work, and under commercial conditions as nearly as these can be approximated by the schools. The shopmen who direct the practical work would possess unusual opportunities to exemplify these qualities, and to develop them as ideals. The relation of worker to employer, the recognition of the mutual advantage of "unscamped"

work, the rights of union action, etc., should certainly all receive some consideration.

e) It is also certain that the psychology of such composite qualities as "pleasure in work," "industrial adaptability," "power to advance," etc., is very obscure; but it is most reasonable to expect that we shall have to learn to realize them thru work of an educational nature in the field of concrete effort. The craftsmanship sense seems a very real thing in most youths; the school may find ways to prevent its destruction and even to minister to its further development when the worker comes under the influence of factory production and minute specialization.

VI. ORGANIZATION OF SUBJECT-MATTER

It has already been made clear that the character of the subject-matter will vary according to predominant industries for which preparation is being made, and therefore according to locality. Under the discussion of the main groups or related industries, suggestions were tentatively made as to organization of subject-matter. The following summaries, tho involving some repetition, are submitted for the sake of further clearness:

A. Concrete work.—Recalling that by this is meant all work with materials in a manipulative way, including analysis of machines, the following principles seem valid:

1. The concrete work should result in products which are usable and under favorable conditions salable. It will be noted that this principle is opposed to the one commonly employed in technical and manual training, where the emphasis is on the exercise, or isolated-type exercise. It is true that in some successful industrial education today, only exercises are dealt with; but almost without exception these schools have highly selected groups of workers. There appear to be strong pedagogic reasons for the acceptance of the above principle in the case of youths of from fourteen to sixteen who are finding themselves in an industrial sense. Since some work in the nature of exercises will be necessary, in many lines of industrial training, pedagogical principles would seem to demand that the work should deal primarily with whole products, reproducing actual conditions within practical limits, and that from work of this character should evolve the technical exercises and laboratory work.

2. While in the earlier stages of industrial-arts training, attention will be given largely to quality of output, there will be stages in the course when, thru actual experience, the significance of quantity should become understood. That is, commercial conditions should be sufficiently reproduced that an abiding appreciation of the importance of rate of work shall be developed. Some schools producing usable products accomplish this by keeping an account of each worker's contribution, and a computation of its probable or actual market value.

B. Technical work.—Already emphasis has been laid on the pedagogical desirability of having technical work—mathematics, drawing and art, sciences, laboratory manipulation, and even English on the formal or expressive side—grow out of and manifest its relations to the concrete work, in the intermediate stages of industrial-arts training. If this point of view is correct, it is evident that we may expect the evolution of more than one kind of shop mathematics, shop chemistry, shop study of physics, etc. The development of this principle

will be persistently opposed by those who believe that the pedagogical orde toward mastery is thru the subject studied first in its pure form. From thi point of view, mathematics must be studied as pure algebra, geometry, etc. first, then its applications; a course in general chemistry must precede applie chemistry in dyeing, foodstuffs, etc. Experience thus far seems to demonstrat that when the available time of pupils here under consideration is taken int account, as well as the importance of securing vital interest in such studies the most effective methods of approach in the technical studies is along th lines of their application, with comparatively short periods of time devoted t the study of pure forms.

In view, too, of the limitations of time, it will be necessary in planning th technical work for each group of related industries, to discover what technica studies should enter, and to what extent each one should figure. There ca be little doubt that all vocational education is today, in this respect, affecte by certain generalizations which emanate from the trade schools connecte with wood and iron work. Mechanical drawing, for example, figures largel in these industries, at least so far as the ability to interpret drawing is con cerned; but there may be entire groups of industries in which mechanica drawing has little or no place as a vocational subject. Similarly with regard t certain sciences; chemistry may be of most fundamental importance in som groups of industries, and quite superfluous in others.

C. General vocational studies.—Around each group of industries may b gathered historical, geographical, economic, and sociological materials which while not conferring immediate efficiency, do undoubtedly give vocationa intelligence and vocational ideals. The evolution of any industry, or group o industries, may be studied (history); the present distribution of such industr over the world, the varying conditions found, the new movement in its source its materials, its machinery, its social importance, etc. (geography); rates o compensation, union conditions, relations between employees and employers competition, effects of immigration, industrial hygiene, etc. (economic)—al these may be made appropriate objects of reading and study. To this grou may be added, in certain lines, studies in the kind of English which has voca tional significance.

The above program does not preclude the development in these schools o studies that frankly have no vocational significance. English literature music, art, history, science, may, if time permits, be studied as cultural sub jects, as resources against time of leisure, or, as sometimes denominated avocational subjects. When we have once settled the program of vocationa studies, we may find time to introduce others which are thus frankly non vocational. Under this head might be placed social or civic studies whic contribute to the making of the useful citizen. But for the present it seem that civic studies, sufficient for the type of youth here under consideration, ca best be given in connection with vocational pursuits themselves, and hence in the division "general vocational studies."

It should be obvious that a program of general vocational studies should aim to reduce formal and detailed work to the minimum. For example, large numbers of mechanically inclined boys delight to read accounts of invention, development of machinery, industrial movements in other parts of the world, etc. Semi-popular journals like *World's Work*, *Scientific American*, and others, should contribute material to this end. With the arising of a demand, there can be no doubt but that we shall have an abundance of good reading materials for each principal field.

VII. RELATION OF INTERMEDIATE INDUSTRIAL EDUCATION TO OTHER FORMS OF EDUCATION

American educational theory is committed to certain ideals of unified education. Consequently it will be asked as to what are the relations of the education described above to the various other forms already recognized. Some of the questions in this connection have already been partially answered.

A. The vocational education described above may be thought of as exclusive of physical, cultural, and civic education, as these are commonly exemplified. Theoretically there is no reason why industrial or other forms of vocational education should take exclusive possession of the field at any time. Practically, in the present development of educational thought it seems almost necessary to make this separation in order to give the vocational education full opportunity to grow.

In schools like Hampton Institute vocational education is effectively correlated with liberal education (cultural and civic forms). Experiments have been tried, and with some success, of having schools divided on the basis of a half-day for ordinary liberal training or academic work, and half for vocational training. Vacation-school work has in places taken the form of vocational work; which gives in the entire year's program an alternation of liberal and vocational training.

B. It is commonly assumed that vocational education does not contribute to culture and to civic development. But this position is not fortified by evidence. The cultural standards assumed are apt to be those appropriate to people of economic opportunities and cultivated surroundings. What is culture when thought of in connection with children who may not undertake the opportunities of a secondary education? Many keen observers insist that in the true sense vocational work, as above described, is essentially liberal in character, that it can be made to contribute the elements of an active culture as well as civic insight and knowledge.

C. What will be the relation of intermediate industrial education to manual training? Present tendencies indicate that manual training will become richer and assume perhaps a more vocational form, occupying a larger place in the program. It is also probable that manual training, as specialized for boys, will be so administered as to reach boys of from twelve to fourteen, without reference to grade. In this case, the bench and shop work will in

many cases become a foundation for the industrial-arts work. It may be assumed, too, that with the establishment of industrial training, this will react back on the manual training, compelling it to assume a more definite and pedagogical character, and possibly causing it to be somewhat differentiated according to the probable future career of the pupils involved. The manual training now found for girls (household arts) is, for some industrial pursuits, a fairly direct preparation. The fundamental difference between the two forms of education consists mainly in the fact that manual training is an instrument designed to form a part of the general training of all children, while industrial training is more or less specialized instruction which deals with selected groups.

D. Can industrial-arts education of intermediate grade be related to the higher technical training? Many educators feel that no system of education should be allowed to develop blind alleys, and they wish to see the way kept clear for any youth to pass from one school to the next higher. While in many cases this is an impractical demand from the standpoint of vocational education, it is by no means impossible to pass youths from intermediate industrial-arts training into the higher forms. While they lack something of the technical training, they will have gained on the side of a knowledge of practical conditions. In Germany, it is well known, a large number of the youths who take the intermediate technical training (not that of the engineering level) must have served a period of apprenticeship. Then the chosen ones from among apprentices are admitted to the middle technical schools.

E. As noted before, the type of school or course under discussion does not assume to fit completely for any one trade. Theoretically at least it will be often possible to differentiate in the last part of the work so as to give some amount of special trade training.

VIII. ORGANIZATION AND ADMINISTRATION

Vocational education under private and philanthropic auspices is commonly organized in separate and specialized schools. When it becomes a part of public education, several schemes of organization and administration become possible.

A. The vocational school may be completely separated in the administration and support. This type is illustrated in certain state schools, which have their own boards, and to which authorities make assignments of funds. The California Polytechnic has thus a completely separate organization. At times it has been proposed that a separate state machinery of administration was necessary to initiate and carry on vocational education. It is argued in support of this position that the administration of the newer type of education requires a different point of view, and different estimates of educational values from those which ordinarily prevail. Also that the degrees of affiliation with business and practical conditions is such as to be most effectively accomplished by having separate governing boards and specially provided funds.

There are a variety of reasons why it may be expected that the state rather than the locality will contribute more to this form of education than to ordinary forms, the chief argument being found in the mobility of labor.

B. The vocational education may be carried on by the regular educational authorities, but in distinctly separate schools, under principals or directors who pursue the distinctly vocational aim. Hitherto it has been hard to accomplish this form of organization in such a way as to produce distinctly vocational education. Only part of the work has been vocational in character, the aims of liberal education being pursued to the relative exclusion of others. But the intermediate schools now being organized in New York, under control of state and local departments of education, provide a variety of checks by which the vocational character of the school can be preserved. These are chiefly: (*a*) state inspection by a special agent of the state education department, (*b*) the provision that the vocational work must be carried on by a separate organization, and (*c*) the requirement that the shop teachers shall be men with practical training and experience in the industries.

C. It has often been proposed that vocational education should be organized simply as a phase of a complete educational scheme, much as manual training is now part of the general program. Various suggestions along this line have been made: (*a*) That half of each day be given to work of the academic character found in the upper grades, and half to shopwork, household arts, etc.; or (*b*) that the ordinary school day be kept for its present purposes, and that the hours from three to five and perhaps Saturday forenoon be devoted to practical work; (*c*) the tendency where vacation schools have been established to use the regular school buildings and equipment during the summer months for practical or vocational work.

Regarding these plans, it has been urged that in the present temper of schoolmen the vocational work could hardly be expected to meet with sufficient sympathy and support, and that the traditional subjects, because they lend themselves so effectively to ordinary methods of teaching would displace the vocational work. Probably this will not always be the case; when vocational training shall have established its own methods and content it may be able to hold its own. Furthermore, programs like the above seem better adapted to elementary vocational work when that shall have been established. In the meantime, much may be said in favor of having the intermediate industrial-arts school under its own roof, and working completely under its own program. There is thus provided an industrial atmosphere, and such a school may be expected to develop its own social spirit. It may require time and tact to prevent the growth of obnoxious class distinctions between the patrons of two different kinds of schools, but this is a problem that has already been met and solved in the universities of America, and in the introduction of scientific and commercial studies into secondary education. Let vocational education once establish itself, and it may become quite possible to provide for an amalgamation of the various types of effort so as to secure social unity and the

maximum of administrative economy; but that cannot be accomplished at the outset.

IX. COST AND SOURCE OF SUPPORT

A. The development thus far obtained in intermediate industrial-arts education is insufficient to justify conclusions as to its cost of support. (*a*) The plant, while not necessarily as elaborate as that requisite for secondary technical education, will, owing to additional floor space required, be relatively expensive for each pupil. (*b*) Equipment, while not necessarily more elaborate or expensive than that now found in technical secondary schools, will have to be found in greater amount in proportion to numbers of pupils engaged, owing to fewer sections that may alternate with same tools. (*c*) Teachers will probably be confined to sections as small as those of the technical high schools, and, where the aim is to have the work eventuate in usable products, it may be necessary to have still smaller sections. On the other hand, there seems to be no certainty but that in some forms of vocational training, when textbooks, guides, etc., shall have been well developed it may prove possible to considerably enlarge the sections under each teacher. It will increase the cost in outlay for materials, especially where useful concrete work is attempted. But under some circumstances profitable returns may be had from this work.

The Manhattan Trade School for Girls, more directly vocational than most intermediate schools, sells enough products to pay more than half the salary-list of the school. In this case, the cost of materials used is especially large. The woodworking school in Rochester contemplates supplying a variety of things needed by the school and other public departments of the city. The textile school in Columbus, Ga., is able to turn out products that can be used advantageously in dressmaking departments of the school. Few schools in metal have so far shown any capacity to do profitable work, the exceptions being reform schools which contribute to their own repairing, blacksmithing, etc. Another exception might be found in the negro schools of the South (Hampton, Tuskeegee, etc.) which dealing with a large type of youth, are able to do productive work in metals.

B. The sources of support of vocational education exhibit great diversity in the United States. Technical high schools are commonly supported by city districts; secondary education in agriculture is commonly supported by the county area, or township area, with some state support. A number of states have state-supported technical schools (Academy, Idaho; Textile Schools, Massachusetts; Polytechnic, California; Industrial School, Texas, etc.). Higher agricultural and mechanic-arts education is carried on in many states by a combination of state and national support, and pending measures in Congress look to the extension of national aid to agricultural education of an essentially secondary grade.

The Commissions that have investigated the subject of industrial educa-

tion are agreed as to the desirability of combining state and local support. Except in New York, detailed plans do not yet appear.

The reasons for local support of industrial-arts education as contrasted with agricultural, are found in the concentration of taxable property in manufacturing areas, and the probable return of outlay in this shape in the increased productiveness of the local industries. But the mobility of labor, so characteristic of America, makes it desirable that a considerable portion of the support should come from the larger area benefited. In fact, so potent is this consideration that it is not improbable that in time it will prove highly economic to enlist national aid to some extent in furthering industrial-arts education, owing to the tendency of labor to move from one state to another. But any scheme of appropriation of aid from state or nation should be accompanied by provisions for local contributions, and should involve inspection by the larger units contributing. It would appear that some control, in the way of final approval, on teachers employed, courses adopted, etc., should emanate in all cases from the state authorities.

A fundamental principle involved in securing of state aid for industrial education is found in the fact that such aid, more directly, at least, than in any other forms of education, must serve in the nature of a social investment, the returns of which will speedily be found in the increased productive capacity of the industries benefited. From the standpoint of economics it may be doubted whether any other form of social outlay of money will so certainly produce a large return, provided the education given is of the right kind.

X. CO-OPERATION OF SCHOOL AND SHOP

In Germany, it will be recalled, a considerable part of vocational training is effected through co-operation of school and shop. Boys are apprenticed to the shops, and are either required to take the school work in the evening, or employers are required to release the boys for a certain number of hours on each of two or more days each week. Under this arrangement the concrete work given in the shop is real and productive; while the technical work of the school can, if desired, be made to correlate intimately with it. The successful issue of this arrangement assumes a considerable spirit of co-operation between school and employer.

In America we find yet few attempts at this co-operation. It is a matter of common knowledge that one engineering school has made arrangements for joint training with the shops of its locality. The high school in Fitchburg has also effected a similar arrangement with shops in that city (see p. 80). It will also be recalled that various large stores and shops have established schools within their own premises wherein their youthful employees might receive technical or academic training to supplement the practical learning acquired in the practice of their work.

These are but indications of possibilities in the field of vocational education. Theoretically, there are few reasons why this form of combined shop

and school training should not be extended. Practically, the conditions of employment in American industries are such at present that it is very doubtful if many such lines of co-operation could be developed. The employer is averse to the presence of young workers unless these are quite profitable to him. For the type of youth here under consideration, the school would manifestly have to have the final authority in controlling his time and education. The school would have to provide for a sufficient variety of work in the shop to prevent mechanization, and to preserve the industrial aspects of the concrete work. The employer usually seeks complete specialization of his workers. The most that can be said is that a goal is presented here whose attainment would be economically and otherwise desirable. But it is evident that a full co-ordination of the forms of control over children would be necessary. Child-labor legislation, compulsory-education legislation, the efforts of employers, etc., would all have to have further adjustment than is possible at present. For example, the law designed to protect children from the dangers of power machinery may, for the present, operate to exclude children in the industrial schools of New York State from power machinery, in these schools —certainly an undesirable result. This entire field is one for further local experimentation.

XI. SCHOOLS ALREADY EXISTING

Schools already existing, from which suggestive procedures can be derived are not many. A few types may be considered.

1. The Hebrew Technical Institute of New York City. This school "does not aim at teaching the higher branches of mechanical, civil, or electrical engineering." "We expect that the great majority of our graduates will ultimately find positions as skilled artisans, etc." To enter this school boys are not required to have completed the elementary course, but must have a fair education along common lines. They may be as young as twelve and one-half years. During the first two years of the course they study the "subjects which will be useful to them in whatever mechanical pursuits they may finally choose." "In the third year they are encouraged to give special attention to that branch of work which seems most agreeable and suitable for each." A part of the work is academic, embracing not only general and technical vocational studies ("Studies of Woods," industries, and natural resources of the United States; drawing; applied science, etc.) but also cultural studies, such as English, history, Jewish history, and civics. A large part of the work is concrete, based on the trades dealing with wood and metal. This concrete work in the last year assumes a specialized character, as instrument-making, practical electricity, etc. Some attention is given to the physical well-being of the pupil, especially in the shape of the provision of a hot lunch at low rates, and the compulsory use of shower baths. The day approximates the working conditions (seven hours for the upper-class students), as does also the year, which is longer than the ordinary school year. Obviously, the school is adapted to produce good apprentices, and to lay the foundations for industrial growth. Its long history proves that it has been successful both in adhering to its original aims and in realizing these aims. It would appear that its conduct involves no conditions which could not be realized under a public-school system.

2. The Manhattan Trade School for Girls, New York. Because the industries for which this prepares involve less extensive technical knowledge, little-developed apprenticeship, and the possibility of entrance at a comparatively early age, this school approximates

more the definition of a trade school, tho its members do not exceed fourteen years of age on entrance, and need not have completed the work of the elementary school. Three of its departments rest fundamentally on textile industries, and another on the industries which employ paper, gum, etc. Academic work is reduced to a minimum, but arithmetic, drawing, and some other studies are followed, largely with reference to their bearing on the particular industries followed. The day and year approximate industrial conditions. It is claimed, and with reason, that, for the type of student reached, and the economic and educational conditions involved, the concrete work itself and the related academic work have a significant cultural value. Children are received at fourteen, stay approximately one year, and the school undertakes to follow them into the industry, and to keep track of them afterward. The products of the school are primarily usable and salable, the school aiming to contribute something to its support by sale of products. The sale of products is adjusted so as not to demoralize market conditions. In the final work of each student, rate of output as well as quality is measured, so as to approximate industrial conditions as far as practicable. This school contributes directly to the physical and social education of its students. Physical exercise, shower baths, and meals are provided in such a way as to bear directly on health conditions. Furthermore, careful instruction in hygiene acquaints the girl with conditions of maintaining health in work, the importance of which is borne in upon each student. On the side of social education, each girl is especially instructed, in connection with the occupation into which she is going, on matters of relation to employers, and to fellow-workers in unions, etc. Owing to the possibilities of correlating much of this teaching, as well as that in hygiene, with actual industrial conditions, they become especially vital to the pupils.

3. The Secondary Industrial School of Columbus, Ga. This is a part of the public-school system, fitting boys for two fundamental industries, mechanical work with wood and iron, and textile work. A course of three years, begins with children of fourteen. More than half the work of each day is concrete in character. The day follows working conditions, and the year lasts eleven months. The textile schools produce cloth for sale, tho some of it is used in other departments of the industrial school. The superintendent believes that the school might to some extent follow the Roycrofters' plan of producing articles which should be of use and would be especially valued because of their fine or individual character.

4. New Bedford, Mass., Industrial School. This school contemplates a four-year program, but each year's work enough of a unit to be profitable to any pupils who take it. Located adjoining high school, and some attempts will be made to avoid social segregation, but the vocational aim of the school will not be lost sight of. It prepares primarily for industries resting on wood and metal; there will be no manual training, and no exercises apart from the making of products. Academic work based on the concrete or shop work. Along the lines of productive work will be the finishing of the interior of the building, which is yet unfinished. Practically trained men will give shop work, and in some cases at least, related technical work. The school to receive one-third of its support from the state, and it is hoped eventually more. Its management is under the high-school committee of the local board, designated for this purpose by the Council. The school will aim to prepare for the better class of artisan work.

5. Rochester Factory Schools. The first school in the scheme was for boys from fourteen years of age who were in the sixth, seventh, and eighth grades, and who were manifestly of a mechanical turn of mind. A two-story building was set apart for the school, the entire lower floor being equipped for shopwork, the upper floor for academic studies related to the vocational work. The weekly program is evenly divided between shop and academic work (shop, fifteen hours; mathematics, four hours; drawing, five hours; English and spelling, five hours; and industrial history, one and one-quarter hours), but almost all the academic work is based on industrial conditions or needs.

The lines at present mapped out (April, 1909) are: (*a*) elementary woodworking,

(*b*) advanced woodworking, (*c*) elementary mechanical and electrical work; and (*d*) advanced mechanical and electrical work.

School is held six days each week, on five of which the hours are from 8:30 to 3, with half an hour intermission. The products of the woodworking shop are to be usable and at present are supplied to the schools of Rochester. Most of the teachers have had practical experience as mechanics or workers in other lines. The local management of the school is under the Board of Education.

6. Intermediate Industrial School of Albany, N. Y. This school plans to take two years of the elementary period, and two years beyond, children entering at or about thirteen to fourteen. The work of the first two years, as proposed, is about two-thirds vocational—technical and concrete; and one-third general—geography, history, literature and composition and civics. Mathematics and drawing are taught with regard to vocational uses, hence are described as technical subjects. Part of concrete work is varied so as to form, at option, beginnings of training for the printing, or leather-working, or woodworking, or metal-working occupations. But so far, in the last two years, the courses seem to plan mostly wood and metal-working callings for boys, and textile industries and household arts for girls.

7. Fitchburg High School, co-operative work. First year is spent wholly in school, remaining three years have program in which each pupil takes alternate weeks in school and in shops. Boy is paid for shop work at from ten to twelve and a half cents per hour. School work is English, current events, commercial geography, civics and American history, and technical subjects (mathematics, drawing, physics, chemistry, mechanism of machines, etc.). An arrangement by which boys are employed in pairs, and by which on Saturday the then shop boy locates his successor for the next week in the work, tends to preserve the interests of employers.

8. Other schools. A variety of private or philanthropic schools offer suggestions for this work. The Hebrew Technical School for Girls in New York, deals with girls graduated from the elementary schools, and has courses two years in length. Its commercial courses are most popular, but its "technical courses" leading to textile occupations are successful examples of what may be accomplished in two years. The program is not limited to vocational work, cultural subjects receiving attention. Schools of the type of the Wilmerding in San Francisco are suggestive as to types of work, but the majority of the students in such schools are above the age of sixteen and they consequently do not represent methods most suitable for younger pupils.

Three-year technical courses are found in some of the high schools of New York City, while the Washington Irving is exclusively a technical and commercial school for girls. Here a considerable part of the program is vocational, and toward the last its work specializes somewhat. But a description of its aim properly belongs elsewhere.

III. REPORT OF SUBCOMMITTEE ON INDUSTRIAL AND TECHNICAL EDUCATION IN THE SECONDARY SCHOOL

The committee has endeavored to study the problems of industrial and technical education in secondary schools:

1. By ascertaining as thoroly as possible the needs and requirements for secondary and technical education.

2. By collecting data regarding methods of instruction and the practices of existing schools within this field, and information regarding the occupations and careers of their graduates.

3. By collecting opinions as to the following points: notably regarding the extent to which the technical courses and the academic work of the schools should be made more directly vocational; whether the time at present allowed to handwork is sufficient; whether the results are satisfactory; the extent to which close correlation is practiced thru the entire school; and whether vocational work can best be done in existing schools or in separate schools.

4. By collecting views on ways and means of making the existing schools and their equipment more serviceable to the public.

5. By inquiring into the needs of girls as well as of boys.

6. By collecting evidence regarding the demand for evening work.

DEFINITIONS

From careful analysis of the existing practices in secondary, industrial, and technical schools, and of the needs of this field of education, as evidenced by the testimony and expressions of opinion from a great number of educators, the committee has formulated the following definitions of three types of schools:

A. The *manual-training high school*, or the *manual-training school*, is a school of secondary grade in which a greater or less amount of handwork is included in the curriculum and in which the greater part of the academic instruction is similar to that found in other high school and college-preparatory schools, neither the manual nor the academic instruction being especially planned to be of direct vocational service.

B. The *secondary technical school*, or the *technical high school*, is a school of secondary grade having the distinct purpose of preparing its pupils for industrial leadership—that is, for positions in industrial life requiring skill and technical knowledge and of greater importance and responsibility than those of the skilled mechanics. In such a school the instruction deals not only with the important manual operations, but also with those principles of science and mathematics and their direct applications to industrial work that will help to prepare the student for successfully mastering the more fundamental processes and problems of those groups of industries which the school is designed to reach.

C. The *trade school* and the *preparatory trade school* are schools which have for their definite purpose the preparing of boys or girls for entrance to the skilled mechanical trades and which deal with their pupils during a briefer course and allow for earlier preparation for practical work than the technical high school. Such schools place their greatest emphasis upon practical handwork instruction under conditions resembling as closely as possible those prevailing in commercial practice. Such schools relate the academic instruction at every point closely to the practical work, and include little that is not of direct bearing on trade work.

CONCLUSIONS

As a summary of its investigations, the committee submits the following conclusions:

1. From a study of the data obtained regarding existing practice, it is

apparent that, with a few notable exceptions, practically all of the existing industrial and technical high schools now operating in the United States as parts of the public-school system, should be classified as manual-training high schools.

2. From the evidence obtained, it is very clear that these manual-training schools are giving a very useful and highly important service.

3. It is also clear from an analysis of the data obtained, that these manual-training high schools, as a rule, do not in any degree cover the field or accomplish the purpose of either the secondary technical high school or the trade school.

4. At the present time, by far the great majority of manual-training high schools—practically all of them, notwithstanding the distinction in name—differ in no important educational particular from the other high schools in the United States; they admit pupils of the same general type, of the same age, and of the same preparatory training. These schools aim to develop the same type of intelligence, the same habits of thought, and the same kinds of ability as do the other high schools; and their graduates are found in the same wide variety of occupations. While the subjects taught are not identical, the manual-training schools are nevertheless essentially schools of the college-preparatory type in which the instruction, mechanical as well as academic, aims to provide the mental equipment of the kind required of those who would continue their studies in higher institutions. All of the work, as a rule, is measured by college-preparatory standards. The fundamental aim of these schools is a general training, and specific training for industrial occupations is incidental. In filling this function, these schools are serving a useful purpose in that they offer a larger variety of means by which pupils who are capable of higher study can obtain intellectual training and preparation for higher institutions thru subjects which are congenial and adapted to their tastes. Important as this function is, the committee believes that the evidence which it has collected makes it entirely clear that the field occupied by the manual-training school is entirely distinct and different from the field to be occupied by the secondary technical school on the one hand and the trade school on the other.

5. The evidence shows that there are very many children who should be, by their school influence, directed toward industrial life and prepared for some sort of efficient service in it.

6. The committee has obtained from a great variety of sources what appears to it almost overwhelming evidence of the very great, in fact, imperative, need of both secondary technical schools and trade and preparatory trade schools, if all of the youth of the land are to be served with anything approaching equal educational opportunities.

7. The secondary technical school, or technical high school, should have for its main object the preparation of its pupils for efficiency in a large group of important positions in industrial life. Its aim is to cultivate industrial

intelligence and those qualities which are essential for efficient industrial leadership rather than abstract reasoning power. It differs from the manual-training high school in the following important particulars:

a) Pupils are encouraged to enter technical high schools with a definite purpose of preparing for industrial careers.

b) It frankly and definitely abandons all traditional college-preparatory work.

c) The time now devoted to foreign languages is given to more thoro training in English, industrial history, and economics, and such principles and applications of science as are likely to be useful in an industrial career.

d) There is very little instruction in pure mathematics or pure science, but instead, a large amount of time is given to applied mathematics and applied science, all of which is closely related to the practical work of the course.

e) As far as possible, all of the instruction, whether in English, history, economics, mathematics, or science; whether in classroom, shop, or laboratory, is so designed as to be directly usable in the kind of occupations in which the graduates of the school will naturally seek employment.

f) There is the closest possible correlation between the branches taught in the school.

g) Such schools will necessarily take on varying forms in different localities, since the needs of the community must, to a large degree, determine their educational procedure.

8. From the evidence which the committee has obtained, it is clear that boys who enter mechanical trades, almost without exception, leave the public schools before graduating from the grammar school. It should be recognized therefore that the beginnings of trade education, if such education is to articulate with our present school system, must be had in schools that will draw their pupils largely, if not entirely, from the class of boys who have not graduated from elementary schools. Such schools (intermediate industrial or preparatory trade schools) cannot therefore be really parallel with existing high schools. In order to prevent possible misunderstanding by pupils or the public, the intermediate industrial school should be frankly recognized as independent in its requirements for admission and in its courses of study. Its courses of instruction must be short. This is essential if such schools are to come within the economic possibilities of boys and girls who will follow manufacturing trades, and only such pupils should be admitted as can satisfy the principal of the school that they are the right kind of material out of which to make good workmen, and are likely to spend their life in mechanical work.

The courses of study for this type of school must always be sufficiently intensive on the vocational side to give them the necessary economic value while at the same time the instruction should be suited to both the mental and the physical capacities of pupils from fourteen to sixteen years of age. There should be in the curriculum, therefore, nothing that is not of direct assistance for preparing pupils for work in the industries. Such mechanical drawing,

mathematics, applications of elementary science and English as are necessary, should be given with the direct purpose of increasing efficiency in the more concrete and practical parts of the course. In other words, the spirit and the method of the shop should be carried as far as possible into all of the instruction given in the school.

Beyond this point (sixteen years of age) comes the possibility of true trade schools in the sense of school training as a partial substitution for apprenticeship or the learning of a trade in commercial practice. Whether or not these last schools will, in the future, become important factors in training large numbers of industrial workers, and whether or not they will become recognized as a proper element in the American public-school system, it is clear that their aim must be to impart the maximum of specialized skill and technical knowledge in the minimum of time. In order that it may be economically possible for the future workman to attend such schools, their courses must be highly specialized and the instruction must concentrate upon the development of skill and knowledge of direct practical bearing.

9. The evidence collected by the committee shows an urgent need for evening trade and technical classes for bettering the opportunities of men and women already employed in industrial occupations during the day. The committee believes that one of the most important services which can be rendered by existing schools that have shop and laboratory facilities, is to extend the use of such equipment thru practical courses of evening instruction.

10. The main ideas embodied in this report are applicable to girls as well as to boys.

11. The problem of secondary industrial and technical education calls fundamentally for a clear distinction between elementary and secondary education which shall take account of the significant differences of children in economic resources, and in the interests and aptitudes that appear before the end of the present period of elementary education. Such a distinction points to the end of the sixth year of school as the appropriate beginning of secondary, that is differentiated education; it does not in any sense contemplate a six-year course as the maximum provision or requirement for any group of children.

I. The subcommittee sent letters to prominent schoolmen thruout the country—men who occupy supervisory positions in cities carrying on technical work, as well as men who are presiding over secondary technical schools, manual-training schools, and industrial schools—inquiring whether there is need for investigating the spirit and purpose of secondary industrial and technical education and for formulating a more definite plan for future extension of industrial work in our secondary schools.

One superintendent of schools writes as follows:

I believe that the committee should formulate a definition of the technical high school, perhaps both from an inclusive, as well as an exclusive, point of view. At the Chicago meeting of the Department of Superintendence in 1909 a number of superintendents

expressed a desire to do something of this kind but were in doubt as to what to do. A strong definition of what constitutes a technical high school will go a good way toward clearing the atmosphere and will be helpful in pointing out the way to those who do not see the light. If this is to be the primary aim of this report, then the data we need relates to what is now being done in the so-called manual-training high schools, with reference to kind of mechanical work offered, the proportionate amount of time devoted to it, and the groups of academic studies offered with their relation to the shop activities—that is to say, whether the academic instruction is based upon the requirements of the shop or whether it is isolated and running in a parallel column.

A principal of a large manual-training high school says:

There is no uniformity in schools called by the same name; no uniformity in the number of hours devoted to shopwork or in the character of the work. My own experience, not supported by inspection of every such school, is that a school which is a manual-training department of a high school is inferior in shopwork and drawing to what might be called an independent manual-training school, such as the Indianapolis school. Especially is this the case where the manual-training department has been added to the older academic department. Where the principal of the older school is not fully in sympathy with manual training or, if in sympathy, does not fully comprehend the movement, the result is foreordained. Here, as everywhere, the principal makes the school.

A professor of education in a university writes:

There is no definitely established policy with reference to secondary technical instruction in any section of the country. Educators in general seem to be vacillating between two extremes, one of which looks toward the making of the handworking courses purely vocational; the other attempting to install the work in the high school as at present organized without materially changing the present status, and hence, of course, making it merely an adjunct to the present work. In the latter case, which is by far the more prevalent, the work fails to be as satisfactory as it ought to be, largely because it is given too little attention and really has not become an integral part of the school work.

The dean of a college of engineering writes:

We ought to get an accurate definition of what we are trying to do. If the manual-training high schools are trying to solve the problem of industrial education, they ought to say so, and if the work is cultural, they ought to say so; at least, let them define what they are attempting to accomplish. If the technical high schools are trying to solve the problem of industrial education, let them say so. If they are training men for colleges, let them make a definite statement that they are not training men for the industries. So far the public-school people have been bowing in one direction, saying, "Lo, our work is cultural," and then in another, saying, "Lo, our work is industrial." Really, what is it?

The president of a technical college who has made a careful study of industrial work in secondary schools writes as follows:

No accurate definition has ever been given to the terms "manual-training high school," "technical high school," etc. These names generally refer to high schools which have, more or less, manual-training work connected with them. So far as I am aware, there is no uniformity in regard to the amount of this work, altho generally these schools give mechanical drawing, turning, pattern-making, machine-shop work, forging, and in some cases, foundry work. Most of these high schools are of the regular type which give the usual high-school courses and fit for college; in addition, they give more or less manual-training work. There is nothing to distinguish them from any other high school except that they do give a little of this practical training. There is need of formulating some definition.

II. These letters are typical of many other replies and clearly show that the work of this committee is warranted. The next step was to obtain, by inquiry, the present status of the manual-training high school. The replies to letters sent out by the subcommittee show a marked variance in the purpose and methods involved in these schools. The original manual-training high school, as conceived by Dr. Woodward, Charles H. Ham, and Dr. H. H. Belfield, has been duplicated or modified in many cities of the country. A word from Dr. Belfield is of interest at this point:

There was the desire on the part of some of us, to offer to boys what was called a more "practical" education than that afforded by the ordinary high school, while avoiding a trade school, to give the boy an acquaintance with the forces and conditions of modern life, to give him the use of his hands, or, as Dr. Woodward phrased it, "to put the whole boy to school." Our thought implied the broadening, not narrowing, of the school curriculum. For many years I had been impressed with the fact that the high school and the academy fitted a boy for entrance upon professional study only; that as comparatively few boys expected to enter upon professional life, very few boys entered the high school, and a much smaller number graduated therefrom. I thought these facts showed a great weakness in the public-school system. I found many of my business acquaintances entertaining the same opinion, but I failed to win to my belief any of my school friends. Two facts are here worthy of mention: (1) The Commercial Club of Chicago, which founded the Chicago Manual Training School, was composed exclusively of business men; (2) I resigned the principalship of the Chicago North Division High School to become director of the proposed Chicago Manual Training High School, against the advice of every schoolmaster friend I had. The original manual-training school was designed to develop all of the boy's powers —to fit him for life, but not to teach him a trade. One hour a day was given to drawing, two hours a day to shopwork, every day in the school year. With these branches were taught, what we considered the fundamental studies of a high-school course—English, with Latin and French elective; mathematics, including arithmetic, algebra, geometry, trigonometry and for those able to take them, analytical and descriptive geometry; physiology, physics, chemistry, history, government, and political economy. The course (I speak now particularly of the Chicago school) was not originally designed to fit for college, but, to my surprise, I found that about 50 per cent. of my graduates, beginning with my first class (1886) entered college, the greater part of this 50 per cent. going to technological schools—the Massachusetts Institute, Sibley College, Michigan, Purdue, etc. Most of the other half went directly into business. Very few entered a shop, and these, by reason of their intelligence, rose at once to be foremen, managers, etc. None, so far as I could learn, remained long at the bench. The academic and shop courses were co-ordinated as far as possible, and it is astonishing how much connection skillful instructors can find or make between shop, laboratory, and classroom work. The school always seemed to me to be a unit. That the scholarship was, to say the least, not injured by the shopwork is clearly shown by these facts: graduates of the school entered, with ease, the best technological schools in the country, maintained themselves with ease, and graduated with credit, frequently with honor. The shopwork was always given credit in the higher schools. In some the boys were excused entirely from shopwork. Credit was also given for drawing, so that it was not unusual for the four-year course of the technological school to be completed in three years. The comparatively small number of graduates who enjoyed scientific, literary, and classical courses in Harvard, Yale, Princeton, and other institutions also maintained themselves. It was to satisfy such that Greek was introduced as an elective in the Chicago school.

This bit of personal history from an authority such as Dr. Belfield, points out the natural development which has taken place in the manual-training

high-school movement. At the present time some of these schools fit for all colleges; some limit themselves to preparation for technical colleges; some have strong commercial courses; and some correlate their shopwork with the academic work. Evidently all of them attempt to give their pupils an all-round or symmetrical education by means of a joining of the humanities with handworking courses. They attempt to cultivate dexterity of hand and eye along with scholarship and mental acumen.

The investigation of Professor Ballou, of the University of Cincinnati, brings out the variety of practice in regard to manual training in the high school. This investigation shows that there is no uniformity, and almost an entire lack of definite aim in the relationship between the manual-training course and the rest of the school work. The committee quotes the following from the results of his investigation:

> There are 33 cities which give the subject of manual-training one and a half hours per week. There are also 33 cities which give three hours to this subject. In the first case a double period is given, and in the second, of course, two double periods. There are 25 cities which devote two hours to the subject and 20 cities that give four hours a week. Those that allot to the subject two and a half hours are eleven in number. Those that give the subject twice as much time, or five hours per week, are twelve in number. The number of cities that give seven hours per week is 25, which means about five one-and-a-half periods, or five times as much time as the 33 cities that give it one and a half hours. Out of 207 cities that offer manual training in the high school, 159 of them permit the students to elect such a course. In other words, 77 per cent. of the cities permit the students to elect the subject of manual training.

Nearly every reply brought out the point that the manual-training high school has no clearly defined status; and that the definitions of the different types of schools are largely a matter of personal opinion. The shortest definition of a "real manual-training high school" which was given to the committee was the following: "A high school with a course in manual training in lieu of Latin and Greek." A number of schoolmen reported a manual-training high school as being a school in which manual training is intended as an aid in general development; that is, that the handwork is virtually a department of an academic high school just as Latin is a department in such a school; that five double periods per week are commonly devoted to this work, three of which are usually given to shopwork and two to mechanical drawing: and that the aim is not so much to develop technical skill as to give acquaintance with materials and the use of tools, the handwork being regarded primarily as a training of the motor side of the student and as furnishing general information of a practical nature. In brief, the manual-training high school, in the minds of these men, is one in which shopwork and drawing are offered mainly for the purpose of supplementing other studies for the so-called cultural purposes of education.

Such a manual-training high school does not differ radically from the regular high school with a manual-training department, for both are simply secondary schools in which the curriculum combines various elements of manual and academic work primarily for purposes of general training.

The principal of one of the largest manual-training high schools in the country writes:

> Our school is claiming to make pupils better citizens, to open up to its graduates opportunities that would not be possible without the training they get. The academic studies, with the exception of Latin and Greek, are the same as those given in any high school, and the manual training is given for educational and disciplinary purposes only.

He agrees with another principal, who states that

> manual training makes pupils better citizens; that the educational work of the school is of the first order; that it is not, in any sense, a technical high school, and that it supplies the higher education demanded by those who are preparing for advanced technical or university work.

It is of interest to compare these statements with those which come later when the question of technical high schools is considered.

A fundamental difficulty in the situation seems to be that many schoolmen believe that every high school should have some manual training and that every manual-training high school should prepare for college, the result being that the layman is confused as to the part that the manual-training high school plays in the preparation for industrial vocations.

As a whole the replies received by the committee seem clearly to indicate that the manual-training high school is ordinarily little more than a regular high school with a manual-training department. As one writer states it:

> I have come to be of the opinion that most of these schools were started as a sop to the demand on the part of the public for more practical instruction in the public-school system. The presence of machinery in a school looks practical, and that is about as far as it goes. While I can see a cultural value in manual training, I do not think it was ever intended to meet the call for industrial training, and if it was, it has certainly fizzled miserably. My own observation leads me to believe that these schools turn out people who disdain to be mechanics and who would rather be inferior draughtsmen.

Another of the replies has the following:

> The manual-training high schools are too elaborate, too expensive, in a way, too dilettante, to lead to anything other than one of the industrial professions. Often they do not even prepare for training in one of these. They are much more like schools than shops, whereas they should be more like shops than schools. In buildings that have nothing of the appearance of the shop, they have machinery, tools, equipment, atmosphere, theory, and practice, which differentiate them widely from the shop. They are managed by men who are more teachers than workmen, when they should be managed by men who are at least quite as much workmen as teachers. Often the machinery and tools make an interesting show without being needed or effectually used, because there is not a skilled workman to use them. Many a time a principal or teacher pleads for an appropriation with which to buy machinery, tools, and other equipment, without any definite theory or plan or end in view. If refused, he would feel outraged and become a martyr. If given the money he studies catalogues and sees agents for the purpose of spending the money in ways that will look well and make an impression upon the people who always love an object-lesson and are often susceptible and superficial about industrial training. Real tradesmen and workmen discriminate, and they are amused by what they see. There is not enough substantial result to it. I know very well that this is not always true, but quite as well that it is often true. Enthusiastic advocates of manual training in high schools have been

content to rest their interest in it upon its all-around cultural and educational value, meaning thereby its value to intellectual virility and energy, rather than upon the fact that it would make a more skilled craftsman and therefore an individual of more character and a citizen of more strength.

The letters of many principals of secondary schools indicate a strong belief in the value of manual training. Such writers hold strenuously that training in the use of certain tools is one of the fundamental procedures in education; that the square, the plane, and the needle lie at the bottom of civilization; and that the use of these tools affords the most direct and rapid means for teaching not only the co-operation of eye and hand, but also that rapid and ready execution of ideas which marks the truly efficient man or woman. Such writers have visions of a system of secondary education so correlated with elementary education upon the one hand and with the activities of life upon the other, that the pupils need not specialize in their work; but that the secondary should be a place where boys and girls can "find themselves" and choose their careers with intelligence. They would not have special schools but a system of general schools sending their pupils out into life—some into trades, some into business, and some on to college and the professional schools.

The breadth and scope of these visions of schoolmen have resulted in great changes in the secondary-school program. Many commercial and industrial subjects have been introduced. Educational procedure in our high schools is in a more unsettled state than that either of our elementary schools or of the colleges. The high school seems to be the battling-ground for educators at the present time, and the elasticity of modern secondary courses of study has made possible a great variety of educational practice relative to manual training in different sections of the country.

There seems to be a movement on foot in some quarters to abolish the old-time classical high school, as such, and to introduce general manual-training and commercial courses in all high schools. In some large cities these schools have been duplicated on the district plan without any attempt at differentiation. This viewpoint is expressed in a letter given to the New York Board of Education by the Brooklyn Educational League, viz.:

We can no longer speak of a uniform course of study for all high-school students. There are at least three distinct kinds of work that should be supplied by high schools in Brooklyn today, namely: (*a*) Commercial courses for both boys and girls; (*b*) industrial courses for boys and girls, including courses to fit girls for homemaking, nursing, and domestic occupations; (*c*) academic courses, including work preparatory for colleges or technical schools, as well as a course designed especially to meet the needs of those who will enter the training school and teach without taking a college course. The present method of building special schools in widely separated locations results in great educational loss, as many students choose a school because it happens to be nearer or because their friends go there, instead of choosing the school best fitted to their needs. In such cases there is a great waste of educational expenditure. The present method of offering only one kind of work in a school places an unnecessary barrier in the way of the student's changing his course when he discovers a change in his aptitudes or his opportunities. The grammar-school graduate is often too immature to make wise and permanent choice of the kind of work he

should follow for the next four years. Placing only one kind of work in a school ignores the fact that one of the most important functions of education, especially of high-school education, is to encourage the student to discover his proper vocation. To perform this function, the different kinds of work must be accessible and each must receive its due measure of respect. The school must have a broad and liberal spirit.

A similar point of view has been expressed by Eugene Davenport, dean of the College of Agriculture, University of Illinois, who writes:

We have learned that education must be adapted somewhat to the ends in view; that as civilization advances and knowledge accumulates, there must be many courses for many men, and we have learned too that there is by nature nothing incompatible between them, because higher industrial education flourishes nowhere else so well as when associated with the old-time courses, that unique and modern association of teaching and investigation that is designed to minister to all the needs, industrial, social, economic, and artistic, of a rapidly advancing civilization. There is no conflict between the classics and the industries, but all thinking men see clearly now that whether the education be classical or industrial, it is alike a part and an essential part of the successful development of a young, strong, virile race. The only question now is as to practical methods of procedure. There is little dispute any more as to the nature of courses best adapted to industrial ends, tho much improvement will be made as time passes. Academic standards and educational values are being set and the future of industrial education is assured, whether regarded from the standpoint of the individual or that of the industry. The only real question—and it is gigantic—is whether, and to what extent, industrial courses should be added to our existing schools or whether they should be relegated to separate institutions. Of one fact we may rest assured at the outset, and that is that industrial education is with us to stay. The industrial people insist upon it and public needs demand it. We can, therefore, find a place for it in our schools, making it an integral part of our system of universal education, or it will make a place for itself and a system of its own. I prefer that we retain the unity and integrity of our educational system by taking into our schools not only industrial education but all other forms of educational necessity that are now felt or that may in the future arise, to the end that all interests may be well served, and that too, in a way not involving influences that tend to break up the homogeneity of our people, but above all preventing the evolution of an American peasant class. Moreover, the strictly vocational courses succeed nowhere else so well as when intimately associated with the non-vocational. It adds directness and initiative to the cultural, thus turning back to the community a product whose individuals are highly schooled in specialized activities and therefor likely to succeed, yet who by association have learned to be broadly sympathetic with all activities and with all classs of effective people. In a word, I would see the policy of the state university transferred to the American high school, to the end that this most representative of all schools may do for the masses what the university is doing for the few.

Many schoolmen who are deeply concerned with the problem of secondary industrial and technical education do not take the point of view so ably presented by Professor Davenport. They feel that there is a conflict within the inner life of the present high school; that the aim and organization of this school were designed for literary purposes and that the aim and organization of the high school for technical, scientific, and commercial purposes are so different that it is almost impossible to unite these aims in one school. They feel that the modern high school is endeavoring to serve several interests, where the organization was created solely for one, viz., literary education for the professions. Figuratively speaking, the house was originally built to

accommodate one family whereas it is now proposed that it be extended to hold several families, each one of which requires different accommodations. Since much of the work has to be done with the same facilities, which are not always suitable for the needs of all these families, there is unavoidable friction, loss of time, and weakening of forces.

The men of this group feel that there should be distinct differentiations in secondary education and that each school should have its own line of work appropriate to the special demands placed upon it. The field of secondary education, they urge, is becoming so large and its influence upon national life so important that the classical or literary high school or even the manual-training high school is no longer able to do justice to the full demands of secondary industrial and technical education.

A number of replies indicate a strong conviction that either the manual-training high school should be organized on its own foundation with the academic work related to the technical work and so arranged as to meet the vocational needs of the students taking such a course, or that communities should establish separate schools for technical education. In this connection James F. McElroy, of the Consolidated Car Heating Company, Albany, N. Y., writes:

> The manual-training high schools do not meet the requirements imposed by actual industrial conditions first, because boys must enter upon their life-work in the industries before a course in the high school can be completed; second, because financial conditions of those who must spend their lives in the industries of the country make it impracticable for the great majority of them to complete the manual-training high school course; third, because the work of the manual-training high school fits men better for foremen than for positions as mechanics.

Mr. McElroy goes on to state that instruction in these schools may be valuable but it is of a higher grade than that required for the great majority of our laboring class.

Similarly Mr. Kruezpointer states:

> The manual-training high schools train their pupils away from the shops and therefore do not reach the great mass of those who are to make their living as practical mechanics and helpers. In quite a number of high schools manual training has been introduced, but it confines itself chiefly to woodwork because of lack of funds for a more expensive equipment and lack of room. What is done goes but a little way because the work is along lines of mechanical dexterity chiefly and the drawing and academic part of the instruction is cramped for time, being obliged to go along with the classical course, the scientific course, and perhaps some other course. Moreover, the boy who goes to high school rarely cares to go into the shop as an ordinary mechanic.

After careful investigation of the status of manual-training high schools and manual training in the high schools, a committee of the Cleveland Chamber of Commerce reported in 1906 the following:

> The amount of manual training taught in the regular high schools in the city is so small that it hardly seems wise to have it retained after the technical high school is organized. At present the students get about forty hours of mechanical drawing per year. We understand that the amount of time given to it is one hour and a half per week and during this time the student must get out his drawing materials at the beginning of the period

and put them away at the end. Very little can be learned in such a short time. The same thing can be said in regard to the work in the other departments. Students who really wish a manual-training course can go to the technical high school, and those who wish to follow courses of study without manual training can be accommodated in the ordinary high schools. We cannot see why machinery should be placed in so many high-school buildings and used only a part of each day. It should be possible for students in the regular high schools to take manual training during the evening sessions.

The feeling that the scope and purpose of the manual-training high school should be changed is not confined to men directly interested in the technical side of education, is evident from the following excerpt of a letter from Dr. Thomas M. Balliet, of New York University:

As for a manual-training high school, which differs only from the literary and commercial high schools in that it has somewhat more shopwork and perhaps more mechanical drawing and a literary course less extensive than the first, and perhaps a less specialized literary course than the second, I confess I see no use for it in the future. It has no distinctive aim and character. In such a school there is so great a lack of correlation between the academic studies and the shopwork that boys and girls recite together in their academic work and separately only in their strictly technical work. Such a school is simply a literary high school with a somewhat narrow academic course and with a little more shopwork. The problem before us is to transform all such manual-training high schools into technical high schools. The manual training of a technical high school is likely to be fully as good, and, I should say, better, than the manual training in a so-called manual-training high school of the type here described. Manual training does not lose its general educational value but distinctly gains by being given a more definite industrial bent than it has had in the past.

Professor Chamberlain, dean of the Throop Institute at Pasadena, Cal., writes:

A manual-training school should offer manual training as an intrinsic part of the course of study and not as an adjunct. Again, this manual training is in one sense the foundation element, and the manual-training high school must come more and more to industrialize its manual training. In other words, it must consider the trades element from the educational point of view. In my opinion, the committee can do a good work in showing that there is a place for a school that shall lie in its academic side between the grades on the one hand and the upper years of the high school on the other. It should teach the industries in the form of trades and from the technical point of view, always in the light of educational theory. These industrial forms of education should be taught not as adjuncts but as part and parcel of the academic side, so that mathematics, English, science, history, and other traditional lines of school work will be seen in their relations to the important aspects of industry

III. It is commonly assumed that there is a correlation between the shopwork and the academic work in the manual-training high school. Such is not generally the case if judgment is to be based upon the answers received to the inquiries on this point. A careful study of the work of these schools shows that they give two kinds of courses—one academic and the other mechanical; and that there is little relation between the technical and academic work. The language work, whether it be Latin, German, French, or English, is the same for the "manual training" student as it is for the "classical" student. The mathematics is the same for all. The same is true of the history and the science work. In short, the prevailing custom in these schools is to conduct

the academic work and technical work as isolated and parallel courses. A number of principals have written that they regret that the academic training does not take its cue from the requirements of the shop. The principal of one of the largest high schools in the country acknowledges that the academic studies are in no way treated differently for students who take the manual-training course than for those who do not take it; that there is no relation between the manual-training work and its corresponding academic work, such as mathematics, science, language, etc. He states that the latter are isolated and arranged without reference to the manual-training work done by the pupils —that his school is one preparing for college; and that a student is expected to do his college-preparatory work in addition to his manual training. In a word, as he states it, "the manual work does not dominate or guide the general policies of the school in its general studies." Another principal takes a pessimistic point of view in that he says:

I do not believe the subjects can be successfully correlated without considerable additional effort in that direction, not by teachers alone but primarily by the high-school officials and the makers of textbooks. There is too much chaff and not enough wheat in our secondary textbooks to enable them to offer the nourishment necessary in bringing about a healthy and active state of mind in the manual-training course.

Still another principal writes that

the two departments (manual and academic) are run on parallel lines rather than by correlating the one with the other. Even where there is some talk of definite relationship one finds that this relationship is on paper rather than in fact. In practically no manual-training course that I am familiar with does any consistent relation exist between the treatment of these school subjects and the shop activity.

In sharp contrast to these statements a few replies are given expressing a different point of view.

In organizing the Technical High School in Cleveland, Dr. Charles S. Howe, president of a special committee of the Chamber of Commerce, recommended:

That there be three recitation periods a day along three different lines of work: one line of mathematics, one line of science, one line of language. In mathematics, that practical arithmetic, algebra, plane and solid geometry, mensuration, and bookkeeping be taught. All of these subjects are to be taught with special reference to their practical application.

Professor Barney, of the Hebrew Technical Institute of New York City, writes:

The compositions and essays in the English department have a direct bearing upon the work in hand and are therefore written with interest and earnestness. The extensive work in the drawing departments incidentally enables the pupil to illustrate most of the written work, and this in itself helps to increase the interest. In the department of physics and applied electricity, certain definite experiments and measurements have to be made from a collection of blue-printed descriptions and problems. These occasion extensive collateral reading and study and carefully kept notebooks are required.

IV. The subject of preparation for college in manual-training high schools was next considered: It was found that the majority of manual-training high

schools fit for the same colleges for which the general high schools prepare. The record of the graduates substantiates this point and shows that in this respect the manual-training high schools do not differ from other secondary schools. The consensus of opinion, however, indicates a strong conviction that it is unwise to fit students for all types of colleges in manual-training high schools and technical high schools. Those who take this point of view believe that fitting for all colleges almost inevitably means that such schools will be dominated by tradition rather than modified to meet the specialized needs of the present; that the high school shapes its work too much toward the college requirement; and that when opportunity comes to organize a new secondary school, it should be planned to provide courses that will meet the special needs of its pupils. As one principal puts it:

To fashion our manual-training high schools so as to fit the pupils for all colleges, interferes with the primary and direct purpose of such high schools. When colleges are more ready to accredit value to the work of these schools it will be time enough for such schools to strain a point, if need be, by way of further encouraging and helping their students to enter such colleges.

Another principal writes that "these schools should make a special effort to fit their students for the greatest usefulness without regard to meeting the requirements of college-entrance examinations."

Dr. H. H. Belfield, of Chicago, writes:

For many years I have maintained that when the high school has become only a fitting school for college, it is not doing its full duty. Many boys do not wish to go to college; many cannot go to college. Let there be a high school to fit boys for college and a high school directly for life. The two do not readily exist as one. The older form (the classical school) should stay; the secondary technical school meets the other demand; it will fit di ectly for business and for engineering schools. With some adjustment, it may also meet the needs of those boys who want the drawing and shopwork for entrance to scientific schools. But the primary idea of the secondary technical school should not be to fit for college.

The president of a technical college states that

the secondary technical schools should not fit for any college except a technical college. The whole idea of these schools should be to fit boys for the manufacturing life, and if, for any reason, the students cannot enter the technical college they should be instructed to do some special work during the last year of their secondary course.

Dr. Balliet expresses a similar idea, and suggests a definite plan, viz.:

While the literary high school should fit for the traditional college and perhaps the engineering school, the commercial high school could well fit for the commercial departments in colleges, and the technical high schools for engineering schools of college rank. It seems to me, however, that we should emphasize the fact that their function as fitting schools for higher institutions is secondary to their functions as above defined. I do not believe that it is well to have a secondary school from which a graduate cannot go to some higher school. All types of schools should be left open at the top to the most gifted pupils. It is more than probable that there will be two grades of technical high schools; those having four-year courses above the elementary schools, and others having six-year courses. The latter would then be practically fitting schools for the engineering colleges, and in that case the engineering schools would be rated in the same way as similar institutions in Europe,

where they are on a "university" instead of a "college" basis. Such developments cannot be forecast with any definiteness; they must come by a natural process of growth.

Associate Superintendent Stevens, of New York City, in response to the question, "Would you have the manual-training high school or the technical high school fit for college?" answered, "By no means. Division of labor must apply in education as elsewhere." It is clear that if a high school is to give its major attention to technical training it will be obviously unable to prepare for any but technical colleges.

V. Let us at this point consider the record of the graduates of these schools. We come now to a consideration of the effect of the manual-training high school upon the choice of vocation made by its graduates. The manual-training high school has never claimed to fit boys directly for industrial pursuits. In its early history this attitude was probably dictated by considerations of policy, but in these days of rapid movement toward secondary industrial education, it is significant that the manual-training high school does not even now fit directly for industries and that there is little apparent tendency to modify these institutions so that they may meet adequately the requirements of secondary technical education. The committee recognizes that the record of graduates of a school depends somewhat upon the school. In a school where shopwork is given but two periods a week, or where the teacher has only a smattering of training, the graduates can differ but little from the graduates of the ordinary high school. Furthermore, it is difficult to judge the work these schools have done by a mere study of the record of the graduates, for a very different showing would be made if a record could be given of those who attended for a time but were not graduated. For example, in the day classes of the Lewis Institute of Chicago, seven or eight times as many students have attended as have graduated and many of these young men have found desirable places in industrial life.

One of the principals of an eastern school writes:

> Few graduates are working as journeymen, but many are, nevertheless, in industrial life as superintendents of factories, foremen, draftsmen. There are a good many journeymen in the trades who have had a year or two in a manual-training school.

Principal Warner, of the Springfield, Mass., school, writes in a similar vein, and Principal Morrison, principal of the Northeast Manual-Training High School of Philadelphia, states that

> the graduates of this school are business men, professional men, professors, clergymen, and the great part of the remainder follow the enlarged opportunities offered in the advancement of the scientific trend of the age.

Principal von Nardroff, of the Stuyvesant High School of New York City, writes:

> Of the present senior class, numbering thirty, twenty-four are planning to continue their education in colleges, higher technical schools, and professional schools, and six are immediately to seek employment in which they will make use of the technical training of

their high-school course. Those who are going on to higher technical and professional schools are doubtless making the best possible use of the education that they have already acquired.

The principal of the Denver Manual Training High School sends the following record:

Of the class of 1908, 51 per cent. entered upon advanced school work in technical school or university; 72 per cent. of the class of 1907 entered upon advanced school work in technical school or university.

The Chicago Manual Training High School, one of the oldest in the country, makes the following statement:

The character of the work of the school may be inferred from the following statement of the occupations of some of its 661 graduates. In manufacturing or mercantile business: 67 mechanical, electrical, or civil engineers; 61 superintendents or managers of manufacturing or other business establishments; 102 designers, draftsmen, foremen, chemists, machinists, electricians; 152 bookkeepers, clerks, etc.; 137 lawyers, physicians, teachers; 134 graduates are in colleges or other institutions of learning; 145 college degrees have been received by its graduates.

Principal Larkins, of the Brooklyn Manual-Training High School, sends the following to the committee:

I know that a great many of our graduates, particularly women, have entered teaching, and that large numbers have gone to college from this school. Some are in clerical positions, some are merchants, and a few salesmen; a great many are professional men and engineers; two or three are draftsmen. So far as the trades are concerned, two graduates became machinists, one of whom has since died and one has left the business to go on the operatic stage. One, after a technical course in Columbia University, has become a plumber; that is to say, he has entered the service of his father who is one of the largest plumber contractors in the city. One or two have become artists, four or five have become electrical mechanics, and a number have become surveyors.

To Principal Bogan, of the Albert G. Lane School of Chicago, the committee is indebted for the following:

From the 40 students who expect to graduate in June, 10 will enter engineering schools; 2 will enter law schools; 6 will become teachers of manual training; 6 will enter agricultural colleges; 4 will enter drafting-rooms; 7 will enter trades, and 5 are undecided.

Dean Chamberlain, of the Throop Institute of Pasadena, Cal., states:

I append my list showing the occupation of graduates. The fact that 13 per cent., as per appended list, are engineers and 12 per cent. are managers, etc., shows that a large number go to technical colleges. Of the 28 per cent. that are teachers and students, a large majority are now in technical colleges. You can see at once that our list tallies with the report of the Massachusetts Industrial Commission, as few go into the trades.

It must be remembered, however, that the value of handworking courses in these schools as Superintendent Stevens, of New York, so well states, "must be judged not only by the record of its graduates but by the proficiency it may give the boy or girl who does not graduate."

The aims of the manual-training high schools as expressed by those who

preside over them, the lack of definite correlation between academic and manual work, and the record of their graduates, together make it clear that these schools are academic rather than vocational in character, that there is little apparent tendency to bring these schools into more direct relationship with industrial activity, and that there is little or no desire to specially train graduates for the manufacturing life of the community. Practically no principal of a manual-training school has suggested that manual training be made more technical or that it be reorganized so as to serve as a preparation for specific industrial vocations.

VI. This subcommittee was directed to examine the possibilities of technical education in the secondary-school field, and to define the functions of technical high schools. This type of school is just now in process of development and it is difficult to forecast just what its ultimate character is to be. We have the engineering schools of collegiate rank, but we have had until very recently no public schools which provide thoro technical training of secondary grade. There is a great variety of positions coming between the engineer on the one hand and the mechanic on the other. The special function of the technical high school should be to train men for these positions. The engineering schools have their own functions and do not give the practical training involving the essentials of a variety of trades and industrial processes which foremen, superintendents of shops, and men of that type need. The technical high school can give this practical training, and in addition, all the scientific and literary training which is necessary for such positions. No doubt a large number of foremen and superintendents, designers and manufacturing experts will, in the future, come from the ranks of mechanics as heretofore, but the majority of such positions are more and more requiring a broader equipment than is afforded in commercial practice. Furthermore, just as the commercial high school should not only train stenographers and bookkeepers and specialists, but also furnish broad training to gifted young men who will occupy responsible executive positions in the commercial world, so the technical high school should aim to give courses broad enough to train men who are to be manufacturers and directors of industry. Such men need a more practical knowledge of mechanical and technical processes than the engineering college now furnishes.

Superintendent L. D. Harvey suggests that technical high schools may be of different types. The committee quotes from his letter the following:

> They may be schools designed primarily to prepare students for engineering courses in higher educational institutions; or schools designed to give such technical training as will enable the students taking the course to master the technique of various occupations, not perhaps to the fullest and most complete limit, but to the limit that is necessary to give them the technical information requisite for foremen and superintendents in many of the lines of industrial work. It is possible that these two functions may be combined in the same school. It is clearly evident that a school, whose courses have in view the needs above stated must have a different content for these courses and must organize them differently than the courses in existence in the technical high schools that aim primarily to prepare students to enter any kind of a higher educational institution.

Principal Weaver, of the Girls' Practical Arts High School of Boston, has the following conception of such a school:

It is one that should aim to give training that will enable the pupil to enter upon some line of industrial work and successfully perform it. Instead of spending time on the various handicrafts, I believe that the pupils should be directed along one particular line. Technical high schools, in preparing pupils to enter the industries, should give thoro instruction in drawing, which is the basis of all handicraft. Our object is to train girls to be competent housekeepers whether they intend to become wage-earners or not. The latter are prepared during the four years to become milliners or dressmakers.

Superintendent Elson, who has had much to do with the establishment of a technical high school in Cleveland, makes the following analysis of such a school:

A technical high school I regard as a scientific school, a school that is headed toward intelligent service in the industries. It has high standards of technical work, it looks to an effective output, and it groups its academic subjects with reference to the needs of the technical problems. The student devotes about half his time to technical and the other half to academic studies. The academic studies include language, mathematics, and science, together with some history and civics, hygiene and sanitation. The usual treatment of the various phases of the academic studies—for example, mathematics—is not followed. That is to say, there is no attempt to teach algebra as a science, or geometry as a science, but rather such parts of arithmetic, algebra, geometry, and trigonometry are selected as are fundamental in carrying forward the requirements of the technical studies. The training in these is such as to give ready skill in the control of the necessary mathematical ideas to forward the technical problems in hand. The result of such instruction should be pupils with a ready, usable knowledge of the fundamental problems and processes in arithmetic, algebra, geometry, and trigonometry. Similarly, science should deal with those topics chosen especially with reference to their utility. The science should be applied science rather than general science. Again, English, German, or French offers opportunity for giving the industrial bias to the work. The theme-writing can well include as topics the products and processes involved in manufacture. Such a school therefore groups its studies, selects its topics, and arranges its instruction with reference to its fundamental needs on the technical side. Such a school is not headed for college. It seeks to make efficient workers and intelligent workmen. The student need not have less culture and he certainly will have a larger fund of usable knowledge than would be possible were the academic studies carried in isolated, parallel lines and developed as entities, or as sciences. . . . . The technical school probably offers some opportunity for specialization during the last year of its course. The manual-training high schools certainly do not meet the needs of the situation. Indeed, from an industrial standpoint they have done very little to help conditions. There are no technical high schools in the country, or at most only one or two; and what they will do in the way of supplying industrial needs can only be determined by way of a guess. My impression is that this is the type of secondary school which has a distinct and important place and which will be of great service to the cause of industry. Indeed, from an educational standpoint, I think the technical high school is of commanding importance. However, to my mind, we need, first, to get our general schools of a practical nature on a more effective basis. I believe that it is wise to move rather toward the making of technical high schools, than toward so-called manual-training schools. The need for a purely literary high school is very limited in comparison with that of the school of the type of technical high school, defined above.

George H. Martin, secretary of the Massachusetts State Board of Education, outlined the place and function of a technical high school in a paper

read at the meeting of the Department of Superintendence at Washington in 1908:

(1) Such a school will have an avowedly vocational purpose. This will exclude the so-called general courses for culture which aim only to offer new intellectual feeding-grounds for boys who do not care to browse in the old academic pastures. (2) The vocations for which such a school would prepare are not in the professions. Hence, courses especially designed to prepare for the colleges and for the normal schools would be excluded, though these are really vocational courses. (3) Technical high schools may be commercial, agricultural, or mechanical. Mechanical high schools may be as varied as the manufacturing industries for which they are to prepare. A school may prepare for a single industry or it may be polytechnic in its character, offering a variety of courses adapted to local needs. (4) In the age of its pupils, in the length of its courses, and in its preparatory requirements, a technical high school should correspond with high schools of other sorts. This would call for four-year courses following the completion of an eight- or nine-year elementary course, and would include pupils, roughly speaking, from fourteen to eighteen years of age. (5) Being a technical school its distinctive function would be to develop economic efficiency, but in common with all public schools it must aim also to develop intellectual and moral character. Each of these aims is both individual and social. (6) The work of the school will be threefold: (*a*) to furnish technical knowledge and technical skill; (*b*) to promote intelligence, breadth, and refinement of a cultural sort; (*c*) to develop a sense of civic obligation. (7) For the first purpose there should be drawing, mathematics, and science, in kind and amount according to the needs of the industry for whose technique the student is preparing. (8) Technical skill in mechanic arts can be acquired only in a shop, so that shop practice must constitute a large part of the work of the technical school. It may be gained either in a school shop or in a commercial shop. Which is better, the experience of the world has not yet determined. Both are in operation and each has its advantages. Undoubtedly a good school shop is better than a poor commercial shop; but a school shop, to be good, must contain the essential features of the best commercial shop. Its instructors must be shop-trained men; its hours and discipline must be those of the shop; and its product must be a salable commercial product. Whether the product should be sold or not is another question. What is true of the shopwork is equally true of the farm work. (9) In order that the student may become a useful citizen as well as a skilled workman, the school course should include history, economics, and civics. Time also should be provided for thoro physical training, including personal hygiene and organized athletics. English should be cultivated thruout the course by composition and forensics. Opportunity should be offered to those students who might find relaxation and æsthetic pleasure in the study and practice of vocal and instrumental music.

The committee does not wish to overlook those cities and towns which cannot have a completely differentiated high-school system, and wishes to make clear that industrial and educational conditions in different communities are so varied that no one type of school can meet the needs of all communities. It may be entirely possible in some communities to modify slowly manual-training courses in high schools, transferring the prevailing cultural purpose into the industrial, without any real loss of culture. In many communities the technical high school is not at all feasible, altho there are many boys who ought to have the opportunity of developing efficiency in industrial pursuits. The committee suggests that in many of the smaller cities the manual-training courses in the elementary school and in the high school may be modified so as to meet this need in a fairly satisfactory way. In such cases every effort

should be made to make the handwork an integral part of the course of study of the industrial pupils.

Assuming that manual-training high schools do not make provision for industrial education of secondary grade, and that technical high schools exist in exceedingly small numbers in this country, it remains to be shown that there is a real need for such schools. First, it may be noted that in the judgment of nearly every respondent, there is a distinct place for industrial education of a secondary character. The manual-training high school was introduced into our public-school system very largely because of a belief on the part of the public that in them students would be fitted for actual industrial pursuits. Now that these schools have found another place in the scheme of secondary education, the field is left open for another type of secondary school that will meet the expectations that were directed upon the older manual-training high school. The committee does not urge that the literary, commercial, and manual-training high schools are not worth all they have cost; on the contrary, it feels that they contribute an invaluable element of modern education. It is only intended to urge that they meet the needs of industrial education only partially, and that their ideals and methods are such that it is impossible for them to meet this situation adequately.

Handwork in secondary education has another mission besides that of general culture. While everyone should know how to use his hands, a preponderating number of each generation of school children must know how to use them for some definite purpose. To them the question is not one of academic culture, but of livelihood. In every great manufacturing city this number is very large. The welfare of a city, its rank among the municipalities of the land, must depend in a large degree on the efficiency of its skilled workers and industrial leaders. That large body of pupils who annually make their exodus from the elementary and high schools, beginning at the sixth school year, to a very large extent, enter low-grade and poorly paid commercial and industrial pursuits. After they work a year or two they often realize their lack of training. Some enter night schools, but most of them are beyond the reach of further educational influences. If some means could be devised whereby these boys and girls would be more definitely strengthened for their vocations, while at the same time they were given a further general education, a long stride would be taken toward making of them more self-reliant men and women and better citizens.

In New York City approximately 37 per cent. of the population are engaged in industrial and mechanical work; 37 per cent. in business, 19 per cent. in domestic service, and 5 per cent. in the learned professions, and undoubtedly other large cities of our country would show a similar distribution. There are many schools for the 5 per cent. in the learned professions, and there should not be fewer; but aside from the engineering schools of college grade, there are but few containing thoro practical courses for the 37 per cent. engaged in industrial and mechanical work. The schools, both elementary and high, are too

exclusively literary in their character for large numbers of average active boys from thirteen to seventeen years. This is a period when such boys need to realize a practical quality in their education. If such boys could enter a school with a definite vocational end in view, where they could feel the interrelation between their mathematics, science, drawing, and shopwork; and where they would realize that they were preparing themselves for definite work in the skilled industries, where their wages would be commensurate with their worth, it is not too much to prophesy that many such boys would continue at school both from their own choice and with the encouragement of their parents.

Investigation seems to prove that there is a demand for this type of school for the education of boys and girls of secondary age who do not care to take up the work of existing high schools and who desire to prepare primarily for some particular activity.

The facts developed by this report also seem to indicate clearly that such a school must be in many ways a somewhat radical departure from present types of secondary school.

In 1906 the Board of Education in Cleveland appointed an educational commission which was asked to make a study of the educational system of the city and suggest such changes as would be beneficial. It took up the question of technical high schools and commercial high schools. In studying the problem the commission reported substantially as follows: Cleveland has six high schools of the old type which fit boys for college or which give them the broad training of the high school as preparation for their life-work, whatever that may be. The majority of students who attend high school at all will continue to go to one of these schools. These schools do not give any special preparation for either the manufacturing or the commercial life of the city, and, in our opinion, there should be one school at least in each of these lines. The commission therefore recommended that a manual-training high school be established having a four-year course with morning and afternoon sessions, which should give at least one-half of each day to study and recitation work and one-half of each day to practical work in the shop, the drawing-room, or the laboratory. The commission stated its belief that the graduates of this school would be in great demand by manufacturers, and that while in some cases they would go into the shops as mechanics, they would undoubtedly, in a short time, if showing the ability, become foremen, and later on, assistant superintendents. The fact that they would be well-educated young men with special knowledge of drawing and the use of tools, would quickly fit them for positions of responsibility. Some of them might go into the shop; some might go into the office; some might become salesmen; but in any, or all of these positions, the practical knowledge they gained would be of utmost benefit.

The report of this commission resulted in the establishment of a technical high school, and Principal James F. Barker, in a speech before the Eastern Association of Manual Training Teachers at Pittsburg, May, 1909, described the educational practice underlying this school. Parts of his address follow:

Large cities are coming to see that they must provide specialized schools to meet the needs and popular demands of their people; that present-day schools do not meet these needs in many cases is all too apparent. The number of children in the various grades in the Cleveland schools are as follows: 1st, 14,509; 2d, 9,992; 3d, 9,530; 4th, 8,780; 5th, 7,702; 6th, 6,179; 7th, 4,974; 8th, 3,154; High 1st, 1,903; High 2d, 1,426; High 3d, 930; High 4th, 740. Compare the first figures, 14,000, with the last figure, 700. The high-school graduating class is only 5 per cent. of the first-grade registration. Figures of this sort have been hurled at our heads till we are weary and yet we do not grasp the significance of a tremendous loss like this. . . . . What is the matter with the schools? Nothing so far as they go. They stop short of their full mission. The difficulty is elsewhere. It is mainly in our industrialism. We must readjust ourselves to these conditions and readjust our system of education. . . . . But education seems to have reversed the usual order of evolution, and instead of growing from the bottom up, it has always been from the top downward. From the university of mediaeval times to the preparatory schools of the past two centuries, thence to the grammar school, and last of all we have cared for the little children in the kindergarten. And following this general trend of education, we establish vocational high schools before vocational grammar-grade schools. So the Cleveland Technical High School, which is a vocational school, precedes the vocational school for the seventh and eighth grades, but the duty of the vocational high school will never be the same as the duty of the vocational school of the grammar grades. A vocational high school must train for industrial leadership, just as an academic high school trains for professional leadership. In planning the course for the Cleveland Technical High School, then, the first step was to free ourselves from the dominating idea of the college-entrance requirement, and this we have done. Our course is a four-year course, predominantly strong in science thruout, with a two-year preparatory manual-training course supplemented by two more years of trade instruction. The two years devoted to manual training have "general industrial intelligence" as the watchword, with an effort to secure as much information related to the industries as can be gathered. At the completion of these two years a trade may be selected by the student, with the assistance of the home and upon the advice of the school. From that time on, twenty hours a week (four hours daily) for two years gives us the desired opportunity to teach trades. But this is only half of the school day. Pupils are still required to study English, mathematics, and science as during the two preceding years, and thruout we are using the industries as the center about which to group the academic subjects. Our first-year mathematics is shop mathematics, with a strong accent upon the simple handling of numbers (simple arithmetic in a high school, note you). Next year we are going to take a group of boys thru a combination course teaching mathematics—arithmetic, algebra, geometry, and trigonometry—as one subject. The first year geography is related to the industries and leads up thru weather and climatic conditions to production of raw material into manufacture and thence transportation. Our English is taking on more and more industrialism. We visit shops, write stories of manufacture, and read stories of invention and industrial discovery. Thru the four years of the school we are relating the English, the mathematics, and the science to the shop problem. We are writing our own text as we proceed. . . . . The industrial branches offered to the boys, of course, differ from those available for girls. Evidently, then, from the relationship between the technical and the academic work, the girls would not receive the same instruction in algebra and other subjects as that given to the boys, and so in all subjects the boys and the girls are segregated. The only place where they recite together is at the noon period during luncheon. In the trades we are offering cabinet-making, pattern-making and foundry practice, machine shop, architectural, and mechanical drafting, printing and bookbinding, pottery and applied design, millinery, catering and cooking. Another experiment which we are watching with considerable interest is that of the Summer Quarter. That is, the school is planned to operate forty-eight weeks a year—twelve weeks constituting a quarter, with a single week's vacation between. To graduate, twelve quar-

ters are required. These may be taken three per year for four years, or four per year for three years, or *ad libitum*. The next class enters July 6. This we believe will mean a great deal to many boys, this shortening of the full high-school course from four to three years. It means more, it means that teachers are paid for twelve instead of for ten months. Strong vigorous teachers can stand the strain just as any business man or woman engaged in other pursuits does. A teacher who would receive $1,500 thus earns $2,000, and has four weeks of vacation per year. One reason why teachers are so underpaid is the fact that during less than 200 out of the 365 days, less than six hours daily are given to active teaching. To date, about one-half of the boys are planning to attend the Summer Quarter. The proportion of girls is somewhat less. In all, our Summer Quarter will enroll 450 pupils. During the last week of the 1909 summer session the attendance was 98.8 per cent. and at no time did it go below 96 per cent. (Principal Barker reports that during the session the school lost an enrollment of twelve pupils out of a total enrollment of 430.) Last year about 5,000 pupils attended the six Cleveland High schools. This fall the Technical opened with an attendance of nearly 700. The total falling off in the other high schools was 42—that is, the establishment and opening of this school supplied the needs of 658 pupils who otherwise would have left school at the eighth grade. If no other good has come of the project, this alone would have been full compensation for opening such an institution. . . . . During the past winter an evening school teaching trades has been open to men and women engaged at the same trade during the day. That is, classes in machine-shop practice, for instance, were opened for men employed as machinists during their working-hours, and so on thru other lines of work. The applicants numbered three times the capacity of the school. One particularly interesting class was formed. An organization of men employing sheet-metal workers is sending its apprentices to evening school. These apprentices are regularly indentured. Part of the contract calls for two years' instruction in the evening technical high school, the employers paying $7.50 per term for four terms for the instruction. Here is a trade that has perhaps felt as strongly as any the need of more intelligent workers. The evening class attendance was over 85 per cent. of perfect in all classes and in some it was 95 per cent. for the winter.

A strong feature of this type of school is the direct bearing which the academic instruction has upon the industries. This is an essential feature of secondary industrial education. Superintendent Harvey writes that the Stout Institute is slowly modifying some of its academic subjects from the traditional ideas as manifested in textbooks in use in high schools with the effort to make the instruction bear a more definite relation to the activities of life than it does in the traditional high school.

Principal Bogan, of the Albert G. Lane Technical High School of Chicago, states that his school is aiming to make all subjects as practical as possible—for instance, much of the mathematics consists of shop problems. In physics special emphasis is placed on electricity. In fact, he proposes to offer a three-year course in electrical physics preparatory to the one-year course in electrical construction. In English a large part of the composition work is devoted to shop activities, and much of the outside reading is devoted to the study of the lives of great inventors, discoverers, and explorers. In physiography unusual attention is given to a study of the metallic ores; and in botany a large share of the time is devoted to a course in elementary forestry closely related to work in the wood shop. Mechanical drawing, freehand drawing and machine sketching, architectural drawing and machine design are closely

related to the work of the science laboratories and shops. In history emphasis is placed on the development of industry.

Dr. Balliet thinks that the shopwork and all the academic work must be most closely correlated. He further states:

> The technical ideal must make itself felt, not only in the shopwork but in all the academic work, and especially in mathematics and the sciences. In such a school, science must be taught as applied science, and mathematics as applied mathematics. Even in such subjects as English and history, the technical ideal must considerably modify the treatment as compared with the treatment of these subjects in a literary high school. In this respect the technical high school must differ radically from a literary high school or a commercial high school with a shop attached to it. Necessarily it follows also that, if science and mathematics are to be taught in their application to mechanical and technical processes, coeducation in a technical high school is impossible in the sense that boys and girls are to study and recite together in the same class; for it is not possible that the two sexes should be interested in the same line of applications. Coeducation, in the sense that one-half of the school may be attended by boys and the other half by girls, the two halves being practically as distinct and separate as two independent schools, will of course be possible, but hardly desirable.

The Technical High School in Cleveland seems to the committee to approach most closely to the definition previously given for such a school. There are several other "technical high schools" in the country, but an examination of their courses of study will show that they do not radically differ from ordinary manual-training high schools.

The investigation also shows that some schools not called "technical high schools" are fulfilling the function of such a school as defined by this committee. The California School of Mechanical Arts at San Francisco is one of these. This school has proved to its own satisfaction that there is a demand for technical training of high-school grade. Its polytechnic course differs from the course usually given in manual-training high schools by leaning more decidedly to the practical or industrial side: (1) in the amount and character of the shop and technical instruction; (2) in the length of the daily program; (3) in the type of its shop teachers; (4) in emphasizing applied mathematics and science in preference to literary subjects; (5) in its distinctive viewpoint and atmosphere generally.

VII. The special field assigned to this committee was that of secondary industrial and technical education. The Committee has thus far attempted to show the purpose, methods, and results of manual-training high schools. It has attempted a definition of the technical high school and has given considerable attention to the educational practice appropriate to such a school. It has emphasized the necessity of a direct relationship between academic studies and shopwork. It has pointed out that the course in such a school should not be influenced by college requirements beyond those of a technical college. It has attempted to make clear that the academic standards of such a school must be different from those of a literary high school, and finally, that the consensus of opinion as based upon the replies seems to be that such a school can do its best work when it is a separate educational unit. While this committee was

not directly concerned with the question of "trades schools," it was thought best to send out a letter of inquiry to ascertain whether there was a demand for trade instruction and whether the technical high school, in some measure, could meet this demand or whether there should be a separate school unit for such instruction. Without any exception the replies point out that neither the manual-training high school nor the technical high school can fully meet the needs of all secondary industrial education. In all the suggestions offered to the committee concerning a plan for secondary industrial education much was made of industrial education of a grade somewhat lower than that of the technical high school. In the words of Dr. Balliet:

> We need a fourth type of school which might be called, perhaps, a secondary school, tho I should prefer, I think, the name "intermediate industrial school." Such a school should cover, in point of time, the last two years at least of the elementary-school course and the first two years of the high-school course. In such a school there can be organized a great variety of courses fitting for corresponding trades. The local needs of the community should largely determine the trades to be taught, and yet not entirely, as in these days the migration of labor from place to place is so easy that we are not justified in urging a pupil to take up a trade for which he has little taste solely because there is a strong demand for it in the locality.

The report of the Subcommittee on the Intermediate Industrial School covers fully this field as outlined by Dr. Balliet, and the attention that this committee proposes to give to this field is merely for the purpose of considering whether some of the work of the intermediate school can be done, temporarily at least, in the building devoted to secondary industrial education. The present discussion should be read in closest connection with that of the Subcommittee on the Intermediate Industrial School. If the intermediate industrial school has a four-year course it will lie either entirely or partly within the secondary field of education, according to the point at which secondary education is assumed to begin. George A. Merrill, principal of the School of Mechanical Arts at San Francisco, suggests the following plan of organization:

> The elementary school should end with the sixth grade. The present high school should be cut exactly in two. Grades 7, 8, 9, and 10 should constitute an intermediate or secondary school by itself. Grades 11, 12, 13, and 14 should be grouped together as a higher school or college. If the tendency thruout the nation is the same as it is in California, it is in the direction of some sort of an arrangement such as I have outlined. For a number of years we have been discussing the advisability of a "six and six" arrangement, taking the seventh and eighth grades from the elementary school and adding them to the high school. Now come the universities asking to have the college freshman and sophomore years (Grades 13 and 14) transferred to the province of the high schools. The desirability of having the elementary school terminate with the sixth grade is pretty generally recognized but the importance of subdividing Grades 7 to 14 into two stages of four years each is what I want to emphasize, tho speaking only from the industrial point of view for the time being. As it stands today, boys finishing the grammar school at the age of fifteen (which is approximately the average) are too young, by two years, to begin apprenticeships. That means that the natural age for beginning apprenticeships comes right in the middle of the present high-school period. The intermediate school that I propose (to include

Grades 7 to 10) would graduate boys at the age when so many of them drop out of the second year of the present high schools, and hence such a school would be the logical place in which to develop "industrial intelligence" preliminary to an apprenticeship. The high school or college that I propose (Grades 11 to 14) is where differentiation should begin. Some would be trade schools, some classical schools, some pre-medical, some technical high schools, some commercial. The basis of this proposed regrouping of the grades is not a matter of speculation; it has been forced upon me through my experience in the Lick and Wilmerding schools. The Wilmerding school is intended solely to teach boys trades, and we have tried hard to keep within that province. Most of our boys we have taken just as they graduate from the grammar school. We have tried to determine whether it is feasible to take such boys and teach them trades as an integral part of their general education and preparation for life, and our experience tells us that it would be better if we could take them two years later in life. The future American trade school must find some way to get its boys at the same age at which boys ordinarily begin apprenticeships outside of school—not because of custom alone, but because that is the time when boys seem mentally and physically ready to begin their trades. Certainly they are not ready or fit for trades at the usual age of graduation from the grammar school. The practical difficulty at present, of course, is in winning back into the schoolroom the army of seventeen-year-old boys who have been out of school three, four, or five years, having dropped out of school when the "industrial instinct" began to manifest itself within them; in other words, at the end of the sixth grade. The industrial branches most suitable to be incorporated in such an intermediate school will have to be determined by trial. The woodwork and forgework of the present manual-training high school might well be retained, since wood and mild steel still constitute the leading materials of construction. That is the test that I would apply, as a rule, in the choice of shop subjects; I would select occupations that have to do with the materials most commonly used in the industries. Applying that test, I would say that electrical work and sheet-metal work are deserving of a more prominent place in school shops, since the modern tendency in the use of metals is in the forms of wire and rolled sheets. In the intermediate school I would substitute electrical work (including light machine work) for the machine-shop course of the present manual-training high school. We have tried it at the Wilmerding School and we find that it works well. I am amazed also to observe how bricklaying has become quite popular as an elective manual-training subject among our students in the Lick as well as in the Wilmerding school.

My next observation has to do with the matter of academic studies in connection with trade teaching. Year by year I have been forced back toward the conclusion that the founder of the Wilmerding School was on the right track when he expressed the idea of "teaching boys trades, with plenty of work and little study." Unfortunately, the average boy who insists on leaving school at the age of twelve or thirteen needs Mr. Wilmerding's prescription, and so does the average apprentice of seventeen or eighteen. The apprentice and the young journeyman who attend night school or who take correspondence courses, etc., do so, not to perfect themselves in their trades, but with a view to getting out of their trades. I am here merely telling what my experience dictates as the proper amount of academic work to count on for the future trade school—not the intermediate school, but the higher trade school. In the intermediate school the boy who wants plenty of work and little study should be accommodated, if he insists on it, but he is the boy who will be expected to graduate from the intermediate school into the trade school, while his more studious neighbor will be a candidate for one of the other high schools.

There appears to be a unanimity of opinion that the trade school should be separate from the technical high school. The majority of respondents have suggested that the term "trade high school" is a misnomer. Professor Charles R. Richards, of Cooper Union, voices the opinion of many when he states:

I do not believe that there is any vital possibility of such a thing as a trade school of high-school grade—that is, in the sense of beginning with pupils who have graduated from the grammar school and continuing with a four-year course. The trade school is not a high-school problem in the above sense, and I do not believe there is any possibility of converting our manual-training high schools into trade schools.

The trade school looks to early entrance upon an industrial pursuit with an equipment of specialized skill and technical knowledge on the part of its graduates that shall make it possible for them to materially reduce the time ordinarily required to learn a skilled trade. It has a minimum requirement on the literary and scientific side and a maximum requirement on the side of skill. While it may look to individual, social, and mental development as well as more skill in execution, it places its greatest emphasis on the making of good workmen. It gives a minimum of academic training and a maximum of ready skill in processes of work in specific trades. Trade schools are not expected to develop leaders and furnish foremen and managers of industrial processes so much as to train the rank and file of the great army of industrial workers where such training cannot be satisfactorily had under commercial conditions.

Dr. Parmenter, of Boston, writes:

I am inclined to leave out the term "high" in this connection, for an efficient trade school will concern itself mainly, in the case of an individual pupil, with the particular line of industry for which he desires to fit himself. The instruction must necessarily be adapted largely to giving knowledge of the principles involved in a particular trade and skill in applying the principles and processes. Little, if any instruction will be given that can properly be called high-school work in the ordinary sense of that term. The above answer implies that I think the trade school should differ very radically from the manual-training high school. If it does not it will be an unnecessary and indefensible duplication of educational machinery.

President Charles H. Howe, of the Case School of Applied Science makes it clear that trades schools are units separate and distinct from other secondary schools. He says:

I believe in trade schools most thoroly and think they are coming as part of the educational system of every city, but when they come, they are to be trade schools, pure and simple, the object being not to give an education to the mind but to teach a trade. I think it will be possible in these schools to fit boys to become journeymen so that they can do a man's work when they graduate. A trades school will be in a building which is exactly like a shop. It will have the same kind of machinery and as many different kinds as the best-equipped shops. The teaching will be done by foremen who are taken out of the shops and who do all the teaching that apprentices in the shops receive. This school will manufacture goods as a shop does and its product will be sold in the market as is the product of the shop. Some manufacturers would claim that this was not a school but a shop. I am perfectly willing that it should be called a shop, but I would still claim that it is a school because its principal object is to teach, while the principal object of the shop is to turn out the manufactured product. A trade school cannot take students under sixteen or seventeen years of age, because if it does, its graduates will be so young that they cannot secure positions as journeymen. In most states the limit of school age is fourteen years. I should think that there ought to be intermediate industrial schools established for boys from fourteen to sixteen like the continuation schools of Germany. In these schools the boys would be given a little instruction in practical arithmetic and they should be given a

great deal of drawing and handwork. I should say that every boy in these schools should have a thoro course in all the branches of handwork without regard to the particular trade he intended to enter and then, at the age of sixteen or whatever age was fixed upon as the proper time for him to enter the trade school, he would begin the study of his particular trade. The training given him in the manual-training school would of course be of great benefit after he began his special work. The broader knowledge of all the trades, or a number of them, which he would get in the manual-training work, would fit him for a better comprehension of the particular work that he was to do, and, I think, in many cases, would aid him in later years to become a foreman or a master himself. I should say that the handwork which I have mentioned and the trade-school work should be entirely distinct from the high school. The objects of the two institutions are entirely different. The industrial school which I have compared to the continuation school would of course be a part of the trade school, because the boy would go from it into the trade school as soon as his age permitted.

The responses seem to have established the fact that vocational instruction leading to trades should begin below the high-school age. We must expect the larger number of pupils to enter trades school from grades below the present high-school period, and we must devise means for attracting and holding them in school. The investigations of James F. McElroy, consulting engineer of the Consolidated Car Heating Co. at Albany, N. Y., not only clearly point out the educational qualifications of men who are in trades, but also emphasize that a trades school cannot have the academic requirements of our present high school. He says:

I have had inquiry made of over 100 workmen composed largely of machinists and hence, representing a grade of intelligence higher than the average. The inquiry has developed two facts in which we are concerned at this time. First, out of 102 men there was not to be found a single graduate of a high school nor a person who ever attended as a pupil in a high-school course. Second, out of 102 men I found only seven who had completed the course in the grammar schools. From this it appears that the education of all of these mechanics was limited to such education as is furnished by the grammar schools and that 93 per cent. of them belong to that class of pupils that drop out of school before completing the grammar-school course. On the inquiry of other people interested in manufacturing I am informed that approximately the same condition exists among people engaged in trades in their employ.

In this connection Arthur L. Williston, director of Pratt Institute, Brooklyn, states:

In my judgment, it is unwise—I would almost say, impossible—to make any compromise between a school where economic considerations govern and are supreme and a school where accepted educational notions govern. For this reason, I believe any compromise between manual training and trade instruction is impracticable.

Dr. Balliet expresses the same thought when he says:

It seems to me it will never be possible to teach trades in a technical high school. The standard of admission would be too high for pupils who are to learn a trade, if it were made uniform with the general standard of admission of the present high school; it would shut out fully 80 per cent. of those who ought to learn a trade. On the other hand, there are very great difficulties in having two standards of admission to the same school, as every practical schoolman will appreciate. To teach trades in a technical high school, therefore,

would mean practically that the school should consist of two institutions namely, a technical high school and a trade school, in one building. It is better to organize trade schools as separate schools than to try to unite them with technical high schools.

The Springfield Technical High School had a course in special shop practice. Experience in this city goes to prove that such a course is not successful when connected with a technical high school. Principal Warner writes as follows:

While our experience proves the attractiveness of practical high-school work of a more general and scientific character than trades teaching, it by no means proves that trades-school work itself in our high schools would prove equally attractive. The experience on this point that I refer to is the history of our so-called C course in the Technical High School. We intended to make this approach very closely to a trades course. It was very far from successful. Boys who entered it in the freshman year left it for the more strictly academic courses along the way, or left school, so that by the senior year we had very few, and sometimes none at all, to graduate from that course. This seems to me to prove conclusively that in Springfield and other cities like Springfield, the pupils who get into our schools under the present standard of admission, even those pupils who have a very decided practical bent, do not belong to the class for whom the trades high school is to be organized.

VIII. Evening trade instruction will be an important possibility of secondary industrial schools. There are young men in business or in shops who would profit by elementary technical training but who cannot take advantage of such opportunities during the working day. One of the most important needs which these schools can fill is to better the opportunities of the youth already engaged in given vocations. The decline of the apprenticeship system incident to the subdivision of manufacturing processes has made it almost impossible for mechanics to secure a broad and generous training. There is a crying need among semi-skilled working classes for industrial education; and the technical high school would be able to offer during the evening both practical and technical trade courses to men and women already engaged in a given trade.

Dr. Balliet, who was the first school superintendent in the country to recognize the value of public evening trade schools by establishing one, writes as follows:

Technical high schools can be utilized for trade-school pupils by organizing trade-school classes in their shops as evening schools, more particularly for men already employed at their trades. There is no reason why, in the shops of every technical high school, there should not be organized a trade school running every night of the week. I see no reason either why the shops of these schools should not be open for trade-school instruction, between, say, four o'clock and six, to boys attending the elementary schools, and from half-past five o'clock to seven for men engaged at their trades in day time. Under the eight-hour law many men are free at five o'clock and could attend a trade school until seven; others could come after seven and attend until nine or ten. In this way the shops of a technical high school would be utilized twelve hours out of every twenty-four. From a business point of view, as well as from an educational point of view, this, it seems to me, would be a wise policy. It would make the instruction economical, make the school popular, and make it a powerful, uplifting force in the community.

The pioneer work of the Springfield evening schools of trades operating in connection with the day technical school has resulted in the organization of similar evening schools in various sections of the country, e. g., Cambridge Mass., New York City, Hartford, Conn., and Providence, R. I.

IX. In the previous discussions the subcommittee has apparently omitted any reference to work for girls. In many of the institutions which have been mentioned, work for girls is as prominent a feature as work for boys. The literature of industrial and technical education is apt to emphasize the necessity of industrial and technical training for boys and to suggest courses of study adapted to their needs. There is no intention here to ignore the problem of girls' training, and much that has already been stated can be applied to the work for girls. The committee sees no reason why the technical high school, intermediate industrial school, and even some trade schools, should not include courses for girls. Naturally the courses of study would differ, but the plan would be the same. These courses should, in many respects, be different from those given to boys. There are some subjects which are studied very largely for general knowledge. These are as valuable for girls as for boys, but while the boys take a large amount of mathematics, the girls might be taught subjects which will be of more direct advantage to them. The girls in our schools will be the wives and mothers of the next generation and the courses of study should be so laid out that these girls will lead happier and richer lives and will be more successful as the future homemakers of our cities. If the maintenance of a finer order of home is a matter of the deepest concern to every member of the community, it logically follows that the appropriate training of the mother —the homemaker—is essential to the general welfare. We shall be wise, then, to test every plan for the education of women, not merely with questions of immediate expediency or of personal advantage, but always with the thought of the larger contribution to the common good, and the higher function which woman can never surrender.

A large class of girls whose elementary education is incomplete, are in imperative need of such industrial education as will enable them to earn a living wage. Thru their self-maintenance, furthermore, the standard of the family life will be immensely advanced.

The aim of the courses for girls is twofold: (1) It is to enable them, thru the right sort of homemaking training, to enter homes of their own, able to assume the most sacred duties with an intelligent preparation, and to perpetuate the type of home that will bring about the highest standard of health and morals. (2) The courses of instruction should also train for work in distinctly feminine occupations. The time is perhaps not far away when every girl will learn some specific kind of remunerative skilled work, just as we expect boys to do. This does not mean that married women will follow a vocation outside of the home, save in exceptional cases. It does mean that girls will generally earn a livelihood in some skilled work during the three, six, or eight years after leaving school and prior to marriage, and will do so for their own and

the good of society; that this earning power will raise the standards of living in their parents' families and give the impulse to a higher level when the girls marry and start their own homes; and further, that this possession of skill in remunerative labor will, after marriage, afford protection and support when a family loses its male head.

Professor Andrews, of the Department of Domestic Economy of Teachers College, New York City, presents the following figures·

> In the United States one married woman in five is a widow and is responsible, as was her deceased husband, for her own support and usually for that of her children. Woman's present relation to remunerative employment in the United States is shown by two facts: (1) Of women over 10 years old, 18.8 per cent. were, in 1900, engaged in remunerative employment. (2) Of the 377 lines of employment for men and women listed in the census, women had, in 1900, entered all but 7, in greater or less numbers. Women are wage-earners, then, already, and if men's training is to be considered, women's must be also.

Taking these two points of view together, it is clear that industrial education for girls should embrace those subjects which the women should understand and which will be of use in life. Dressmaking, millinery, and cooking should be taught, not only with the idea of enabling girls to direct a household in a better or more economical way, but also to make them proficient enough so that they can earn a living if economic conditions demand it. It is increasingly evident not only that the demands of modern life are thrusting into the background the instruction that will be centered in the home, but also that the women are entering the industries. With the disappearance of industrial activities from the home, the increase of apartment houses, the multiplication of ready-made conveniences which have greatly modified the education of girls, there has been an accompanying increase in the number of women who are obliged to earn their living which makes it desirable that girls be trained in some special occupation. Advocates of industrial education for girls feel that training for efficiency in any line of industry will make for better women and better homes. In short, the educator is confronted with a twofold problem, as far as the education of girls is concerned: (1) Opportunity must be given for women who are never to become wage-earners to gain a knowledge of industrial conditions and processes through the introduction of technical and scientific schools and courses. (2) Opportunity must be given for women who are obliged to become wage-earners at an early age to receive training which will enable them to enter some specific industry where continued development is possible.

A brief description of the Boston Girls' High School of Practical Arts will point out how girls are trained to meet these two needs: The school has a four-year academic course in which the girls receive a general education which better prepares them for future duties in the home and in society. The academic departments are English, history, art, mathematics, science, and modern foreign languages. The industrial department presents household science and arts, sewing, dressmaking, and millinery. The instruction in the practical

arts aims to give not only a knowledge of the various processes in each industry studied, but also a comprehensive understanding of these processes in relation to the entire scheme of work. This instruction should insure for the girls who seek employment, advancement to places of responsibility in the industries open to them. The purpose of the art department is the cultivation of taste thru a study of the principles of beauty and its application to the problems of dress and the home. The course in mathematics has two distinct purposes: to train the girls to think logically and clearly, and to enable them to solve simple problems intelligently. A woman should be able to write down her household accounts accurately as well as to understand the pinciples of algebraic and geometric problems. Principal Weaver of this school writes as follows:

A general course for all girls is given during the first year. At the beginning of the second year they may choose for their industrial course which runs thru three years, either domestic science, dressmaking, or millinery. While especial attention is given to this chosen industrial subject, training sufficient for home needs is given in the other two. In the millinery and dressmaking courses an effort is made to introduce shop methods; a study is made of the materials used and of their cost; record slips showing the amount of material, price, and time given to the work are kept with each piece of work. The work of the drawing-room is closely related to that of the shops. Before a garment, or hat, is begun, a drawing is made giving full details; the design taking into consideration the figure of the girl, the quality, and kind of material to be used. This design is taken to the shop and serves as a working-drawing. When the garment is completed another drawing is made of the product. The same plan is pursued in the millinery course. The pupils taking domestic science make drawings along the lines of house-building, furnishings, decorations, etc. We fully realize that drawing is the basis of our shopwork. Inasmuch as this school has been in existence less than two years I am unable to give any information touching graduates. I have, however, great confidence that girls who finish this course will find employment at fair wages, and be able to advance rapidly to good positions. Our academic work, as well as the drawing, correlates with the shop. Descriptions of various processes, with materials in hand, are required as lessons in expression in good English. The chemistry deals with the questions of food, clothing, and shelter. The aim of these courses is to set before the girl the highest ideals of home life; to train her in all that pertains to practical housekeeping; to cultivate good taste in furnishings and decoration; to give thoro instruction in sewing as a foundation for dressmaking and millinery by such training as shall lead the pupil toward the highest standards in the selection and making of her own garments and give her the ability to plan and execute for others.

The Cleveland Technical High School has a department of industrial-art training for girls. The nature of the studies and the purposes in view are so different as to demand a separation of the girls from the boys. There is therefore organized within one building a boys' school and a girls' school. The purpose of the work in domestic science is threefold: (1) To teach all subjects pertaining to the care and duties of a home, that girls may be prepared for practical housekeeping; (2) to teach all theory relating to the above subjects as applied science, that girls may acquire intellectual development as well as practical skill; (3) to teach institutional cookery and kitchen management as trade subjects, that students may be prepared for catering as a voca-

tion. To attain the end of training for housekeeping all work must necessarily be very practical and comprehensive. The home is a complex institution and its management involves the study and practice of preparation of foods, cooking and serving entire meals, washing and ironing clothes, cleaning, first aid to the injured, care of invalids and children, household accounting, expenditure of income, marketing, house-planning, sanitation, household furnishing, and decoration. All these must be taught in the most specific and practical ways. Each student must be taught not merely about doing household duties, but to do them. An attempt is made to correlate with the technical subjects all academic subjects included in the course for girls. In arithmetic, problems are given involving the standard weights and measures used in cookery. The student is drilled in dividing the quantities used in the ordinary recipe that she may appreciate the relation of the individual to the practical recipe. The cost of various foods at different seasons is computed in order to obtain an estimate of the average cost. The keeping of household accounts and divisions of the family income are also problems to be solved. Exact computation of food values and the grouping of these foods to form well-balanced menus involve mathematical problems that are studied with profit to the housekeeper in the arithmetic class. The course in chemistry is directly correlated with domestic science, and its aim is to give such experiments as will be of practical value to the girls after finishing school. For instance, if eggs are cooked in the kitchen laboratory, during the same week their composition and properties are ascertained in the chemical laboratory—hence, the theory of foods in the second-year cooking classes deals largely with food composition and food manufacture. Domestic-science subjects are often given as themes in the English classes. See also the courses in domestic and applied arts for ways in which these are correlated with domestic science. In short, all technical subjects involving homemaking are taken as the basis of the course for girls, and the rest of the studies are grouped around these. The lunchroom in connection with the school affords excellent opportunity for the girls desiring to specialize in institutional cookery. After having learned the fundamental principles of cookery, the student may go into the kitchen of the lunchroom and prepare food in large quantities and also study the management and plan of conducting such an institution. The aim in domestic art is to give such training as will enable girls, as they grow to womanhood, to appreciate the practical, economic, and artistic value of various materials in their application to dress and home furnishings. The course includes plain sewing, the making of outfits for use in the departments of domestic science and domestic art, undergarments, shirt-waist suits, simple summer dresses, and millinery. Principles of handwork in the way of rolled edges, setting-in of lace, hand-run tucks and elementary embroidery are introduced and applied to underwear. Original designs made by the pupils are used for this work and in the decoration of the table linen for the dining-room of the domestic-science department. The course in spring and fall millinery is

provided for girls who have learned some of the fundamental principles of sewing. Millinery affords the girls a broad expression of individuality and aims to create an appreciation of artistic color combinations and appropriateness. The subject is closely connected with the courses in dressmaking and applied art and consists of talks on materials used in millinery, wiring hats, making buckram and straw hats, wire frames, facings, building bows and covering frames, renovation of old material, and trimming hats. Attention is given to economy, simplicity, suitability, and the cultivation of artistic taste in all lines of work. The work in applied arts correlates in very definite and practical ways with dressmaking, millinery, domestic science, and the mechanic arts and crafts and with the many occasions in daily life in which an intelligent appreciation of fitness and beauty add greatly to vocational success or personal happiness. Complete courses in plain and hand sewing, machine sewing, spring and fall millinery, and the applied arts are available to women in evening classes. Plain cooking and whatever allied courses may be called for by a sufficient number will also be within the scope of the night school.

MINORITY REPORT

As a member of the Subcommittee on Industrial and Technical Education in Secondary Schools I have signed the foregoing report; but while I agree in the main with the other members of the committee, I find that my observation and experience constrain me to take exception to the definition of the "technical high school" as it appears in the main report. In my opinion technical high schools should occupy the field just below that of the engineering schools or technical colleges without losing their naturally close relation to them. To give them this relation is not necessarily to make them merely preparatory schools for such higher institutions. Rightly directed they may give thoro training for industrial service in the lower sphere without losing sight of the possible engineering student. On the other hand, to deny them all preparatory-school functions is to specialize them to such an extent that they cannot, in my opinion, become a large element in the secondary-school system of the country. In all cities where it is possible to organize highly differential types of secondary-school work in separate schools, designating them so that they will assist parents and pupils in making a wise choice, the specialized technical high school, as contemplated in the definition to which I would take exception, may be of great service; but my strong conviction is that the development of secondary technical schools in cities of moderate size and in the country at large might receive a serious set-back if a broader definition of their function is not recognized. In fact, a few technical high schools are already successfully carried on under this broader definition. Owing to local conditions they could not have been organized under any other definition. They offer an encouraging example to other communities similarly situated. Their existence should be made consistent with this

report without necessarily compromising the point of view which recognizes the value of a more highly specialized form of secondary technical education for certain other communities. Furthermore it is generally recognized that the open-at-the-top policy is a natural characteristic of American education. I am not able to see in the existing educational situation any universal condition that demands that all secondary technical schools should frankly abandon preparatory work for higher institutions and especially for higher technical schools or for engineering courses in college or university. I therefore offer the following

DEFINITION

The secondary technical school or the technical high school is a school of secondary grade, the distinctive tho not sole purpose of which is to prepare its students for industrial leadership—i.e., for positions of great responsibility in industrial life, requiring technical knowledge, tho not so profound as that of the engineer, and a certain skill, tho not so highly specialized as that of the skilled mechanic. In such a school much of the instruction deals not only with the important manual operations but also with those principles of science and mathematics and their direct applications in industrial work which will help to prepare a student for successfully mastering the more fundamental processes and problems of those groups of industries which the school is designed to reach. It assumes to be the finishing school for large numbers of boys and girls and therefore must contain in its curriculum the essentials of those studies which give breadth of view and inspire to self-improvement. To many of its students it may open up new prospects and reveal a capacity to realize them. If any considerable number of students in such a school wish to prepare for continuing their studies in higher institutions, special provision should be made for them without interfering with the distinctive aim of the school.

CHARLES F. WARNER

A SELECTED BIBLIOGRAPHY ON INDUSTRIAL EDUCATION

NOTE

In preparing this bibliography of the literature on Industrial Education to accompany the report on "The Place of Industries in Public Education," the principal aim has been to select the most serviceable books, reports, and periodical contributions dealing with the various aspects of the subjects which are considered in the report.

While but few of the writings listed deal exclusively with European Industrial education, many foreign references and illustrations occur in the literature dealing with the American phase of the problem.

In order to keep the lists within reasonable limits only books published since 1892 and articles from periodicals and society proceedings since 1900 have been selected. The list has been revised to July, 1909.

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